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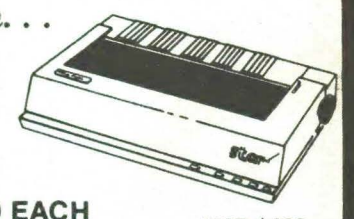

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New Epson QX-16, Triple Operating System Computer

by Rich Fields

With all the hoopla about integrated, "user-friendly" computer systems for the PC-type computers, we tend to forget that the first of the integrated personal computer systems was Valdocs, running on the Epson QX-10. This machine remains the standard by which all "easy-to-use" computers must be measured. However, for computer users experienced on CP/M-based 8-bit machines, the early versions of Valdocs are painfully slow. To new users who never operated a personal computer before, the QX-10 and Valdocs is everything it claims to be, and they do not seem to mind the slowness at all. Chris Rutkowski, the Chairman of Rising Star Industries, has claimed that when Version 2 of Valdocs comes out, it will "do everything, and do it fast, real fast." The new version includes a spreadsheet with graphics, indexed file manager, address book and electronic mail as well as the enhanced word processor and scheduler modules. Valdocs 2 was introduced at **1984 COMDEX Show in Las** Vegas and will be supplied with the first QX-16 computer. It will also be available for the QX-10.

Meanwhile, Epson is not putting all their eggs into the Valdocs basket. They have introduced the new QX-16 Personal Computer which is a 16-bit, 8088 CPU computer with a Z80 co-processor. This new machine offers the user a choice of three operating systems: MSDOS, CP/M-80 and Valdocs 2.0 (running under CP/M). It is not an IBM PC clone, but it is compatible with the IBM PC when it is in the 8088 mode. How do you get into the 8088 mode? You simply boot the MSDOS system disk and there you are—presto! While you are in the MSDOS mode, the floppy disk system is running double density (360 Kbytes per drive). The computer will boot and run many IBM PC programs, but there is yet no study on the percentage of compatibility between the QX-16 and the IBM PC.

When a CP/M-80 system disk or Valdocs system disk set is installed into the disk drives, the capacity of the floppy disks automatically becomes quad density (720 Kbytes per drive).

The QX-16 comes with 256 Kbytes of RAM, expandable to 512 Kbytes and two 5¼" floppy disk drives. The disk drives have a capacity of 360 Kbytes per drive in MSDOS mode, or 720 Kbytes per drive in Z80 mode. Winchester hard disks of 10 Mbytes or 20 Mbytes are optional.

Other standard features of the QX-16 include three expansion slots. This is where the difference between the IBM PC and the Epson design is the strongest. The expansion slots are not PC compatible. You can only use Epson type expansion cards in these slots.

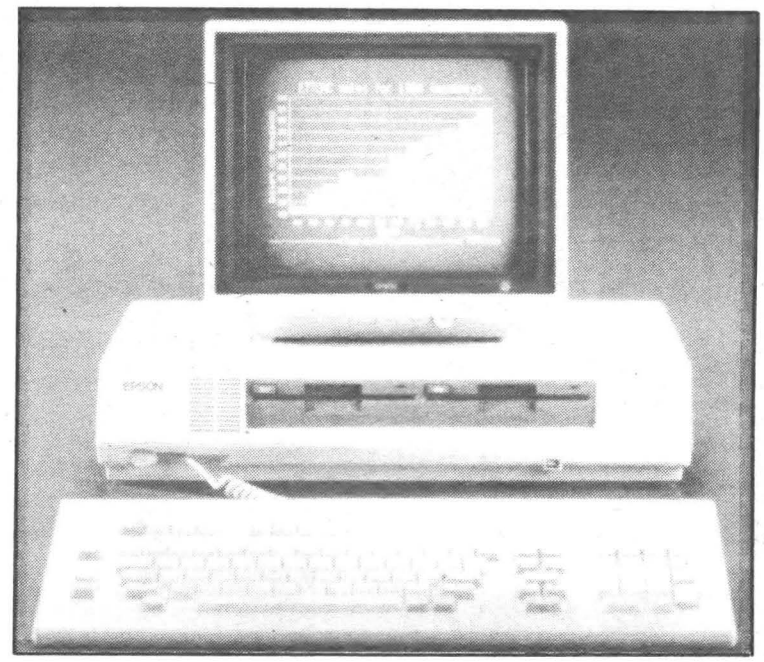
Standard features of the QX-16 include a clock/calendar with battery backup, IBM PC video emulation board and both a Centronics-type parallel I/O port and an RS-232C serial I/O port.

The QX-16 keyboard is a IBM Selectric-type with a 10-key numeric keypad. It is somewhat similar to the HASCI keyboard used with the QX-10 Valdocs system, but instead of having titles on the keys for the single key functions, there are slots above the keys where key titles can be inserted. Therefore, when running Valdocs, the single keystroke titles are used. When running MSDOS programs the function keys are used as the F1 through F10 keys expected on a PC keyboard. The Epson keyboard has an excellent "feel" and is a pleasure to use.

With all the hoop-la about integrated "user friendly" software, we tend to forget that it was Valdocs running on the QX-10 Computer that started the whole thing. Now Epson has come out with a 16-bit version of this easy to use machine. It runs the long-awaited Valdocs Version 2 plus MSDOS and CP/M-80. A contender for the title of "Best all around computer".

The QX-16 comes with a twelve-inch, high resolution (640 by 400 pixels) monochrome monitor. A high resolution color monitor is available as an option. Other options include a direct connect 1200 baud modem.

The final pricing of the QX-16, which will be available early in 1985 is not set, but it will be under $3,000 for the complete 256K, dual-drive computer with monitor and software. This is the same introductory price that the QX-10 was sold for and it represents an excellent value. You get a lot for your money. Because this computer is built by Epson who has its distribution, service and dealership network in place, it deserves much closer consideration than a computer built by an unknown company.



New Epson QX-16

The concept of triple operating systems sounds good, but I wonder just how many CP/M-80 programs will ever be used with this system. Between Valdocs and all the modern software available under MSDOS, I think that the average user will find the software ever needed. The new

Continued on page 8

1985 — The Battle Of The Operating Systems, I

by Wes Lewis

In case you haven't noticed, there is a war going on among operating systems for personal computers. The stakes are very high for hardware and software manufacturers. The right DOS can make a difference of millions of dollars to their revenues. No wonder they are concerned with what DOS you are using. But what does the user get out of all this, and what does it cost in the process? These are the important questions to most of us. As users, how do we determine what DOS satisfies our needs. The choice is not always obvious and the choice could add hundreds to thousands of dollars to the cost of your PC.

If all of that seems extreme, consider the case of CP/M. Prior to CP/M, each of the many different microcomputer systems had their own flavor of control program, most of which could barely be considered operating systems. Software was not readily available because each system had its own quirks. Some used teletypes for I/O, others used memory mapped CRT's much like current PCs. Programs for a Northstar floppy disk wouldn't run on a Processor Tech drive, and so on. Once you got your system and software running, if you added a new device, a lot of your programs wouldn't run any more. Clearly, something had to change, and a large part of that change was CP/M.

CP/M transferred three key concepts from mainframe operating systems into the microcomputer environment. These were a simple command driven user interface to execute system functions and user programs (the command processor), a clearly defined software interface to a logical view of the computer which allowed the programmer to request a read of the next sector of a file without knowing where that sector was physically (or for that matter, how large that sector actually was), and a replaceable segment of physical device drivers (the BIOS) which actually performed the I/O operations required by the user's program. These may seem to be concepts more important to computer science types, but actually they have a major impact on the usability of the personal computer, the availability of software, and the ability of the user to choose the peripheral devices which best suit his individual needs. Let's take a look at how this happens.

In case you haven't noticed, there is a war going on between operating systems for personal computers. The stakes are very high for hardware and software manufacturers. The right DOS can make the difference of millions of dollars in their revenues.

The Replaceable BIOS

A lot of the initial support for CP/M came from the hardware manufacturers. Once CP/M was available, they no longer had to provide a full operating system in order to sell their systems. This cut their costs and increased their market considerably. But the user got a lot as well. With a reasonably solid operating system base, he could install new or different devices, such as terminals or printers, and be reasonably sure he could get them to work.

Another feature of CP/M was a simple form of I/O redirection. For example, list type output could be rerouted to any of several printers, or a communications line with a simple command. You may have thought that this was a UNIX or MSDOS 2.0 type feature, but that's obviously not true. The concept is extended in both these DOS's,

Continued on page 8

Fields continued from page 7

Valdocs alone may be enough for some people, but it is comforting to know that you have MSDOS programs available. I do not know exactly how many IBM PC programs will run on this machine and which ones will not run. I await the receipt of a test unit from Epson that I can experiment with and put through its paces at my leisure. I will report on this test and review in a later issue.

Epson QX-16 Personal Computer Specifications

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but it existed in the early CP/M.

It's important to be aware of this. In the heat of the current hype about various flavors of DOS, it often seems that you must have a particular DOS to get a particular feature. Since most DOSs evolve, it is very seldom that they cannot provide a particular feature if the market demands it. The other thing to be aware of is the obvious point of the old 80/20 rule. 80% of the problem is solved by 20% of the code. The simple redirect provided by CP/M was implemented with several hundred bytes of code. The full blown redirection and piping of MSDOS and UNIX requires several thousand bytes of code. If you need the features, you willingly pay the price. But even the modest facilities in CP/M helped make it a huge success.

The Software Interface

Although hardware manufacturers were behind the initial success of CP/M, it was the software developers who turned it into a defacto microcomputer industry standard. To see the impact, consider how many Apple systems have added additional hardware in order to be able to run CP/M. This is not because CP/M is a better DOS than the Apple standard, but because of the wealth of CP/M software available that Apple users wanted access to, in spite of the fact that Apple had one of the largest software bases around even without the CP/M programs.

What makes it work was that in the CP/M environment, programs do not read and write to physical devices on the system. Instead they read and write to CP/M logical devices and files. In this way, a program written using the CP/M interface will run on any CP/M system. Instead of a market of several thousand users for a particular program, you now have a market of tens to hundreds of thousands of users. This makes it more reasonable to expend extra time and effort in developing a program with advanced capabilities.

CP/M, The P-System and MSDOS provided transportable software. Instead of a market of several thousand users for a particular program they provided a market of hundreds of thousands of users. This made it more reasonable to expend time and effort in developing programs with advanced capabilities.

But there is a snake in this Garden of Eden. Notice the phrase "written using the CP/M interface" in the above paragraph. If you don't use the interface, you have just lost the portability that CP/M (or any other DOS) promised. Why would any developer choose to do this? Two major reasons, either the DOS does not provide the desired function, or the function provided is limited

Continued on page 10

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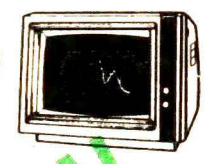

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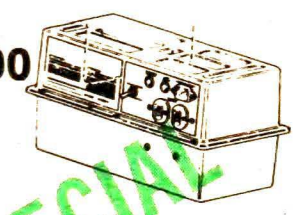

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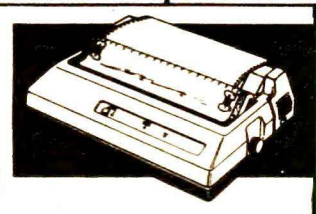

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in function or performance. In the early CP/M world, full-screen word processing programs such as Electric Pencil and Wordstar were severely hampered by the lack of cursor positioning and similar screen oriented facilities. (Remember that CP/M was originally written for line oriented devices such as teletypes.) In order to work properly, these programs had to bypass the CP/M terminal output facilities and provide their own support. This situation even continued into the MSDOS environment where programs like Lotus 1-2-3 felt it necessary to do their own screen I/O because of the poor performance of the MSDOS screen facilities. This is even more obvious in the graphics area in MSDOS where no functions are provided (although the announced GKS support packages may change this).

This also points out another potential problem with a DOS providing the base for portability between different machines. Let's call it the "Least Common Denominator" school of software development. Innovations in the hardware area are seldom anticipated in system software development. As a result, it may be several years before operating systems and language libraries properly support these new devices. The developer then has a problem. Should he incur the additional development and support costs to use the new hardware on the machines for which it is available and therefore provide a better product for a smaller market? Or should he wait until the hardware is available for all his target market machines and the operating system and libraries support the hardware? In a way, this may be what saves the small, entrepenurial software developers from obliteration by the major developers. If the majors enter the LCD school, there will be room for the small shops to provide special products for more limited markets. This may turn out to be healthy after all.

The User Interface

In order for the whole concept of a DOS to work, certain operations that the user must perform must be done according to the DOS's rules. Disks must be formatted, directories must be built, files must be copied, and so forth. These facilities must be provided by the DOS in order to insure that they are done properly. In order to manage the PC, the user needs certain facilities such as listing directories, listing or printing files, setting up communications ports, and others. These are generally provided by the DOS, but can be replaced at the user's convenience.

The thing that makes a difference is how easy these functions are to use without error. Unclear command names or ambiguous command options can wreak havoc on a system. How many times have you heard of people who formatted their hard disk with the floppy disk format program, or who erased entire disks by mistake. If this didn't happen, recovery programs such as Disk Explorer and the Norton Utilities wouldn't be so popular. As the amount of data stored online and the number of users of the system increases, the exposure to error increases significantly for everybody using that system. Cryptic, two letter commands followed by a bunch of one letter options are great for DOS developers and help reduce the size of the DOS, but they can lead to very serious errors when the user gets confused. Stored files of commands can help reduce these problems, but are not really the answer.

Since the advent of CP/M we have learned a lot about building an effective and usable DOS. As PC's grew more powerful, users require more from their machines and the DOS has a major impact on how much that is possible.

The Other Issues

Since the advent of CP/M, we have learned a lot about building an effective and usable DOS. Also, as PC's have grown more powerful, users require more from their machines and the DOS has a major impact on how much that is possible. Perhaps the biggest issue is how many users and how many tasks can be operating on a single PC at one time. Let's define three levels of facility:

1. Single User - Single Task
2. Single User - Multiple Task
3. Multiple User - Multiple Tasks

For the time being, lets consider a task to be a program of DOS command. We all start out at level 1, as did CP/M, but soon progress to wishing we had level 2. The need for level 3 depends on whether you are using the PC as a personal assistant rather than as a less expensive way of providing traditional data processing services. Let's also look at how the available DOS's meet these needs.

Single User-Single Task

This is the place we all start from, and several choices are available. Let's look at CP/M-86, PCDOS, MSDOS, and the UCSD p-system to get an idea of how to evaluate what you need and what you might wind up getting.

When the IBM/PC was announced, everyone expected CP/M-86 to be the DOS. It had a reasonable user interface, had the device driver concept, and the massive amount of software which could at least theoretically be converted from the 8080/Z80 environment to the 8086 environment of the PC was impressive. Whatever the reason, that's not what happened. As it turned out, many of the program conversions from the 8080 environment didn't turn out to be effective anyway. Although there was a period of about a year when PC software was scarce, the major successes were written for the PC and not converted from previous systems. As a result, CP/M-86 is almost a dead issue except for certain specialized environments.

The UCSD p-system is another case in point. Once again there was a lot of good software around based on the p-system that could be transferred to the PC. But here we had two problems. Because of the machine non-specific nature of p-system, the programs which were converted were annoyingly slow. The other problem was that it took a long time before p-system programs could get data from PCDOS/MSDOS files. This made the good tools much less useful in the IBM/PC environment. As with CP/M-86, the bulk of the PC users and software developers decided not to use p-system and we have another DOS serving a limited community.

MSDOS is Microsoft's generic version of PCDOS. It's primary purpose is to support the manufacturers of lookalike/workalike competitors of the IBM/PC. Because of the proprietary nature of some of the code in PCDOS and the ROM in the IBM/PC, MSDOS and PCDOS are not identical. Here again, because of the number of programs which bypass the normal PCDOS facilities, MSDOS cannot provide portability of programs between IBM PC's and the lookalike machines. The lesson here is if the developer or an operating system cannot provide program compatibility between similar machines, who can?

Whatever you think of it, PCDOS has become the new defacto standard operating system. The command language is a bit easier to use than the original CP/M even though the initial release didn't have as much flexibility. It has been evolving over time and Releases 2 and 3 have brought it closer to a full-function DOS. Additional facilities, such as the GKS support, hold promise that it will continue to evolve. The key issue is not what features does PCDOS have. The real thing to consider is how much will it cost you to replace all the software you use today if you were to

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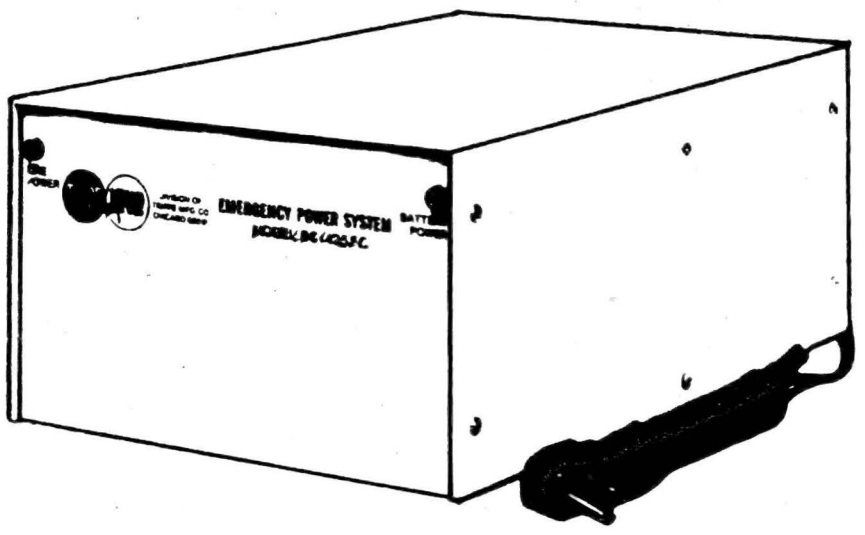

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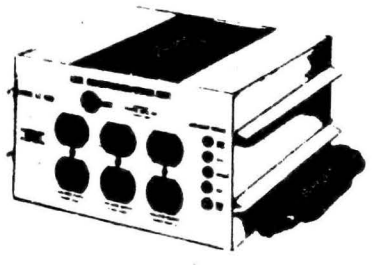

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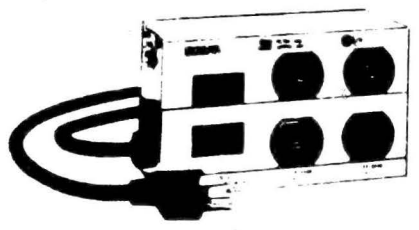

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switch to a different DOS?

Let's jump ahead briefly and look at some of the issues of new programming technology being introduced by UNIX proponents. The issues of modular programming, the C language, filters, and pipes are all addressed in the PCDOS environment. The actual implementations may leave something to be desired to a theorist, but simple changes in PCDOS could make them highly useful. As an example, adding an environment variable that tells PCDOS what drive to put "pipe" data sets would allow piping to RAM disk and speed up things considerably.

Even more to the point, closely consider how you use your PC. Many of these "advanced" techniques are of use to the professional developer or data processor, but may not be useful to you. A good example is pipes and filters. The idea here is that the piece of work you want to do can be handled by a combination of small and specialized programs, called filters, with the output of one program being "piped" to the input of the next for further processing. In a text processing environment, this would mean that you would edit your text file with your favorite editor. This file would then be passed through a document formatting filter, then on to a printing or typesetting filter. If your major function is to print a lot of documentation and document updates on your PC, this would probably be a handy facility. But if you like the current batch of on-screen, "what you see is what you get" word processors or the integrated packages such as "Framework", then this filter/pipe facility is not what you need. Perhaps a more modest facility that could be used for the occasional data conversion and utility task you do have, would be much more appropriate.

As I have said before in other contexts, be sure you really know what you are going to use these "advanced" facilities for before you decide you will pay the often significant price for having them.

Single User - Multiple Tasks

Once you really begin to use your PC, the limitation of only having one program in the machine at a time becomes a major annoyance. Having to save a document and exit the word processor in order to look up something in your data base can be very time consuming. One of the attractions of integrated software packages is the degree to which they avoid this problem. That's fine if the integrated package you are using does the job. But what if you want to do something not part of that package? You have now encountered one of the major reasons for the interest in multi-tasking operating systems.

Whatever you think of it, PCDOS/MSDOS has become the new de facto standard. The command language is a little bit easier to use than the original CP/M. It has been evolving over its various releases into a fully functional DOS. The real thing to consider is how much will it cost you to replace all the software you use today if you were to switch to a different DOS?

Since PCDOS does not yet provide general multi-tasking facilities, a number of attempts have been made to add this capabilities in the PCDOS environment. Programs such as Des-Q and Memory Shift are typical. They have met with some success, especially when all you want to do is suspend one task and run another. But even here they have trouble. Considering the number of programs that bypass DOS or steal interrupts like the keyboard or timer, its a surprise they work as well as they do. With the right mix of programs, they can be as effective as a full multi-tasking system for most users.

CP/M also took a crack at this need with Concurrent CP/M. This is a true multi-tasking DOS with some very sophisticated features. But once again we have the problem of software availability. Most of what users want to run is not available on CCP/M, at least without paying another license fee. There have long been rumors of a Concurrent DOS coming from Digital Research, but to date I have seen nothing real. This product would supposedly allow PCDOS programs to be run under CCP/M facilities. If this product sees the light of day and does an effective job of mapping PCDOS to CCP/M, it could be a real winner. But even here there will be potential problems. It is going to take a hardware assist such as can be provided by the 80286 cpu chip to make a multi-tasking DOS that can support the current program environment.

XENIX and PC/IX as derivatives, are also candidates here. On the standard PC or PC/XT, the same comments apply as for CCP/M. Also, review my comments about advanced programming technology in the single task description. It doesn't seem profitable to me to devote half of a 10 meg hard disk and a 512K minimum system to run an operating system that doesn't do much more for me than CCP/M. On the 80286 based PC/AT there may be a different story. With the 286 hardware, it will be possible to build a DOS that avoids the mutual self-destruction of multiple tasks that happens in the 8088 environment. But even here, there is nothing preventing a PCDOS with the same facilities. Given a choice, I would stick with the PCDOS software compatible environment. As I said earlier, there is great interest among developers for making UNIX a standard operating system. The economics are definitely in their favor. But are they interested enough in getting us into the UNIX environment to provide free, or even nominal cost, upgrades to their UNIX product from the PCDOS version? I sincerely doubt it.

Multiple User - Multiple Tasks

Before we even get started here, let me ask a question. Do you really want to share your PC with other users? If you have worked with minicomputers of mainframes you know what multiple users do to an interactive environment. There should be a clue in the fact that the PC/AT provides

Continued on page 14

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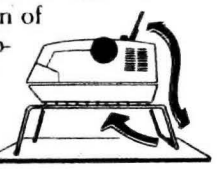

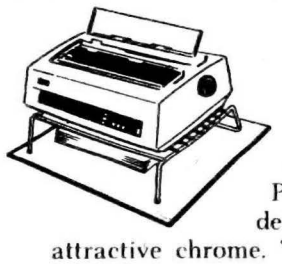

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Lewis
Continued from page 12

three times the processor speed, three times the memory, twice the disk capacity at twice the access speed in order to support three users. CP/M had the same problem when it tried to go multi-user with MP/M. After the smoke settled, the most effective systems were based on each user having his own cpu with dedicated memory and terminal port while sharing access to hard disk and printers through the DOS. Except for the fact that it was packaged in a single box, this sounds a lot like current networking systems to me. There's probably a lesson in that.

Admittedly, there are applications that absolutely require full multi-user, multi-tasking capabilities, but these are not what most PC users are doing or are likely to do.

Wrapping It Up

You may have gotten the impression that I am down on UNIX and it's offshoots. That's not the case. Many of the ideas generated in the development of UNIX are very important and useful to all computer users, personal and otherwise. Much like was the case with CP/M, part of the good ideas came from the fact that both were developed and enhanced by people who were not hardware manufacturers, but were more oriented towards user needs. Much of the popularity and many of the enhancements of UNIX came about because of the ease which educational institutions could obtain source code licenses for UNIX. With the entry of AT&T into the hardware market, I wonder how long this will continue.

The idea of being able to have portability of software between various machines is, at least on the surface, a highly desirable one. However, past experience with languages and system utilities has proven portability is by having a very tight standard agreed on and adhered to by all concerned. Considering the various needs of those who must adhere to the standard, this can be a difficult and lengthy process. Past efforts have always had enough loopholes to drive a fleet of trucks through (known as optional or partial standards). The problem is that this lengthy process tends to slow down innovation. Fortran today is only slowly catching up with modern programming techniques. Good ideas such as Pascal and C developed outside of the standardized environment, even though they are now regarded as standards by their own communities. As a user, consider how often you expect to change to a significantly different computer. Balance that with how often you would like to be able to use new facilities on your existing machine. From a PC user perspective, I think it's more important to encourage speedy and orderly introduction of new facilities rather than getting to a standardized environment.

But the lesson of all of this is that every one of these operating systems have their own valid user community. To make the right choice, you must really understand your own needs. Changing to a different DOS can be expensive. Be sure you need the features you are buying and have a good idea of how and when you are going to use them before making the leap. Evolution has long been a powerful force and there is no reason to expect that today's DOS's will not continue to evolve. What is important to you as a user is your personal investment in time, money and experience. Get the most out of that and it is hard to see how you can personally go wrong. ●

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Editorial

By Stan Veit

Fifth Anniversary Issue!

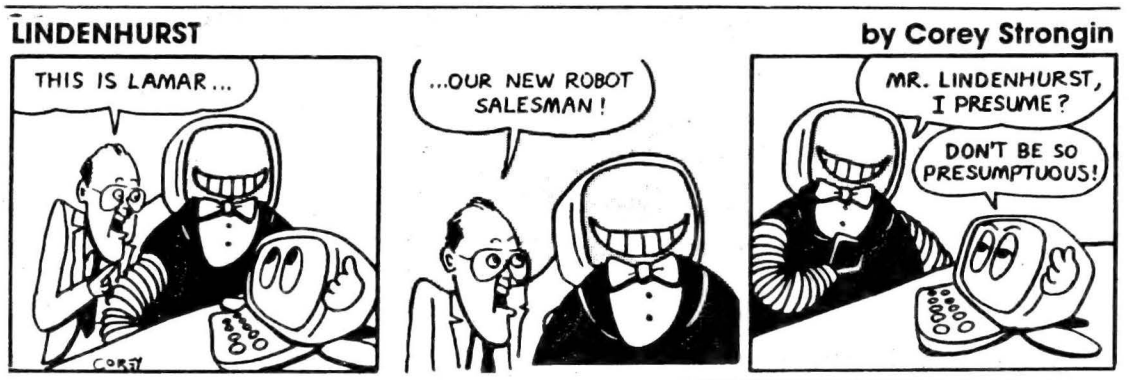
Five years ago, the first Computer Shopper appeared in my mail box, and I read it from cover to cover. I had been a subscriber to something called ON LINE, a newsletter where you could advertise used equipment for sale. Having sold some gear I had no use for, I really was no longer interested in the newsletter, but I still got it because I had subscribed for one year in order to get my ad printed. I suppose that most other people were like me, and ON LINE was not doing that well. The publisher sold out to Glenn Patch, publisher of Shutterbug Ads, the Bible of the used camera world. Glenn started Computer Shopper from the subscriber base he got from the ON LINE newsletter. The first thing I noticed was that Computer Shopper was a real newspaper, full of ads but with a small amount of editorial content.

It was the editorial content that got me involved with Computer Shopper. Some writer who signed his name with a PhD after it, had written what was supposed to be a history of personal computers. It was a joke. This character knew nothing about the subject and I felt compelled to write Glenn Patch and tell him about it. Before I knew it, I was writing a column "VEIT ON COMPUTERS" all about the history of personal computers (not to be confused with "VEIT ON SOFTWARE," a column I did for Computers & Electronics magazine). I watched each issue get bigger, filled with money-saving ads and more editorial content. Finally, in 1983, Glenn Patch felt that the time had come to expand Computer Shopper into a real magazine. He offered me the job of Editor-in-Chief, and after months of working out the details I came to Titusville and began the task of turning the largely ad-filled Computer Shopper into a new type of computer magazine. My orders from Glenn Patch were to put out a magazine designed to interest, educate and save our readers money. That is the bottom line. Always try to help our readers save money on computers, peripherals and software. No other publisher ever issued such a directive to his editor. No other publishing company even cares about saving money for the readers.

Working at Computer Shopper is different from working for any other publishing company. This is really a team effort. It makes no difference if you are in editorial, sales, production, accounting or administration: when the time comes to get our issue out every month, we all work for you, our reader and advertiser.

You must like what we are doing because we keep on growing, and we get very few "Hey, you turkeys don't know what you are doing" letters. Our percentage of newsstand sales is one of the highest in the industry and our subscriptions are growing. We would like to grow faster, but at a time when other computer magazines are going out of business, you are giving us a vote of confidence by buying our magazine and buying from our advertisers. Thanks!

Our second five-year plan is to give you an even better magazine and to reflect all the changes that are under way in the personal computer industry. Our instructions from the boss have not changed and they will not change. ●



Things To Come

We have almost made a full turn in our orbit and it's time for my annual predictions of things to come. Before I put myself on record with predictions for 1985, I will take a look at what was predicted at the start of 1984. In the February issue (which came out in January), there was an article *The Gurus Look At 1984*. Let's look at how they did.

Ted Nelson, author of *Computer Lib* the first personal computer book, saw 1984 as a year of "Confusion." He was certainly correct this year with the demise of manufacturers, software publishers and magazines, and the entry of AT&T.

Tony Gold, the co-founder of both Lifeboat Associates and PC magazine predicted that the IBM PCjr would make an impact on the market in 1984. Score: one wrong.

Ed Judge of Radio Shack "sort of" said that they were going into 16-bit computers. They sure did—both with the Model 2000 and the Model 1200 HD (XT-Clone). Another correct prediction.

Larry Stein of Prodigy Computer said that retailers would be mainly into vertical markets. I will take about a 50% mark on that one.

Chris Rutkowski, President of Raising Star Industries said

Continued on page 16

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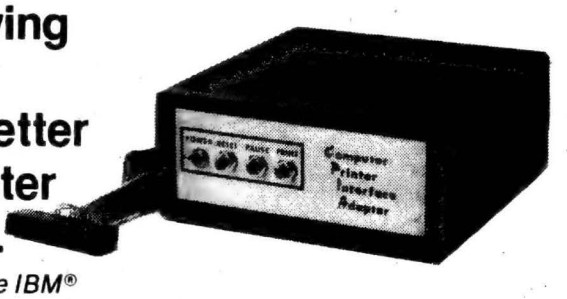

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Veit continued from page 15

the Valdoc's Revision 2.0 would be out and it would do "damn near everything." It never made it. He also said that Jerry Pournelle would eat his shirt on the steps of Brooks Hall in San Francisco because of a bet with Chris. Jerry ate no shirt! Score another zero for our Gurus' predictions.

Overall, our last batch of Gurus didn't do very well, so I will not consult them this year. Instead, I asked a mystic, who I happen to know very well, if he would stick his neck out.

Here goes Guru Yelnats Tiev and his crystal ball:

MSX computers will be released in the U.S. this year and they will become very popular. They will obsolete Commodore 64, Plus 4 and Model 16, as well as existing Atari computers. The buying public is waiting for low-end computers with interchangeable software. The public will buy only when they have the confidence that the manufacturer will not be out of business tomorrow. The big Japanese firms will give them that feeling.

If the Japanese companies don't introduce the MSX computers this year, they will lose the "window of possibility" because by 1986 there will be 16-bit and 32-bit, low-priced computers with much better graphic capabilities.

Coleco will drop Adam after Christmas. Commodore will continue to sell C64 computers but the Plus 4 will die a slow death.

I would predict that Atari would fail to make it through the year but for Jack Tramiel. I never question what he is doing. I have done so many times before and he has always come out on top. Good Luck Jack!

Tandy Computer will release the Model 200 Lap Portable but it will never make the impression on the market that Model 100 did. They will fold the Model 4 and all 8-bit machines by the end of 1985 and move on to the 16- and 32-bit machines. Radio Shack will replace COCO with an MSX computer.

IBM will make the AT its "standard" PC, the XT will become the lower end of the line and there will be few PCs around, but hundreds of clones. They will come out with a lap computer made offshore. The big thrust of IBM will be into the software business. They will buy, repackage and market every type of PC software. The biggest factor in the success of this marketing effort will be the short life of software companies. Nobody wants to buy from a company who will be out of business in six months.

Telecommunications will become one of the most important parts of the industry. Direct satellite communications using small dishes and centimeter-wave receiver/modems will enable computer-to-network communications without the use of the telephone system. Computer-to-computer communications on the same path will take a little longer. The telephone communications will start to move to 2400 baud, and 1200 baud will become the minimum.

Some of the Public Networks like CompuServe will be in financial trouble. They are not getting enough return on investment to pay for the huge billing costs required to bill 100,000 people for paltry sums like $12! They will try to impose minimum charges like $50 a month. This will hurt at first but the net effect will be to jam the networks. All of the people who founded the popular SIGs on CompuServe are now long gone. I hear John Gibney has left CompuServe. If so, it will be a hard loss for the SIGs. The Source will also have a rough year. Although it is trying hard, it continues to lose money and even Reader's Digest can't take that too long.

1985 will see the end of computers as a special cult thing. They have become appliances and business machines. To say nothing of toys! Computers are now truly tools for the mind and "no big deal" to anybody. The hi-tech groupies will have to work in exotic things like 3-D graphics, speech input/output, and robotics to maintain their status as techno-snobs.

Magazines will continue to fold and new ones will start-up. To me, a former Ziff Davis editor, the break-up of that company is one of the most shocking stories of the year. Mr. Ziff is selling all of the consumer magazines, except the computer magazines and many of those will be dropped or merged. I have to predict more of the same in 1985. However, by the end of the year, the computer magazines will stabilize at about 15-20 major titles. Computer Shopper will

Continued on page 17

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by the Lunch Group & Guests
Published by Workman Publishing, New York, NY
Reviewed by Rich Fields

This wonderful book, subtitled "The comprehensive user-lovable menu of computer, lore, culture, lifestyles, and fancy" has something delicious for everybody. It makes a great gift for anyone who has the slightest interest in personal computers, but first make sure your personal copy is anchored down.

The Lunch Group is a pack of computer press people in New York, who gather at press luncheons to talk among themselves about the happenings in the industry and the world of computers in general. Steve Ditlea, the editor of the Deli has collected pieces by group members and supplemented them with articles with a list of authors from Ray Bradbury, William S. Buckley, Steve Wozniak, to Timothy Leary, Ted Nelson, Henny Youngman. The editor of this magazine, Stan Veit is a member of the group and has contributed several pieces to the book.

As in any good Deli, the selections are vast and are divided into meal courses: Appetizers; Soup & Crackers; Personal Choices; Family Favorites; Creative Combos; Brain Food; Foreign Delights; Fresh Greens; Small Fry; Just

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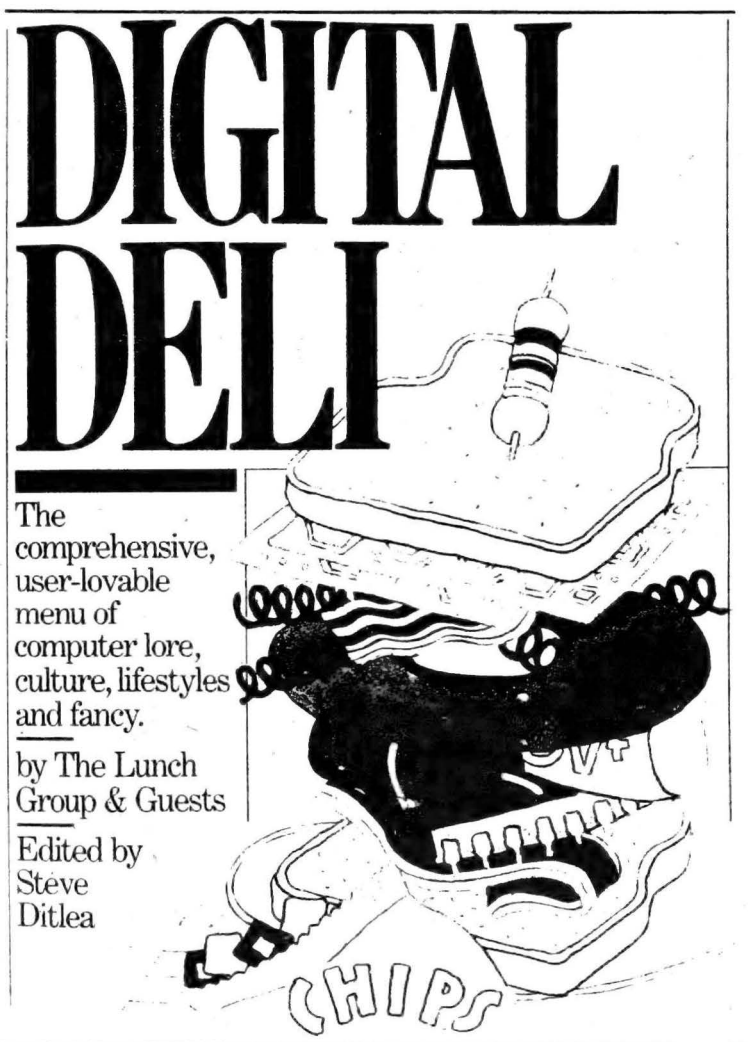

Veit continued from page 16

be one of them.

The peripheral field will explode with new printers, modems, plotting boards, graphics boards, and disk drives. The printer field will see the most radical changes with laser printers replacing daisy wheel printers as the choice for word processing. In 1985, we will see the introduction of color laser printers that will reproduce a page at a time. Color ink-jet printers will also become popular as prices drop and quality improves. The quality of "near letter quality" dot matrix printers will also improve until you will not be able to tell the difference between dot matrix printing and daisy wheel printing. The speed will increase so that you will be able to buy a 200 CPS letter quality printer for less than $600.

The price of RGB video monitors will go down until you will be able to buy a fair resolution 12" or 13" monitor for about $250 to $300. At the higher end, the resolution of monitors will become vastly improved. Color reproduction beyond your wildest dreams will be available at modest cost. Mixed video tape and computer graphics will be common.

Portables, from the wrist computer by Seiko to the full hard disk, MSDOS, flat screen model, will become the status symbol of business. The common use of portables in business will only come when the flat screens become more readable.

Texas and Florida will outstrip California as centers of the personal computer industry in the U.S.

So speaks the great Guru Yelnats Tiev. Turn to this page next year and find out if he bats over .500. ●

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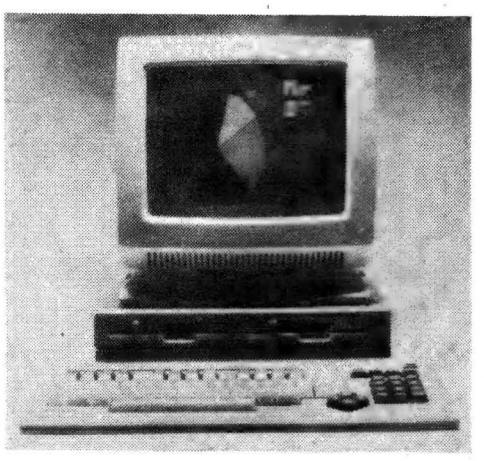
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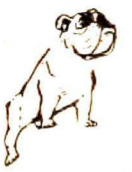

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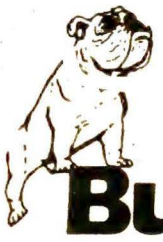

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Lunch Group
Continued from page 17

Desserts and Tomorrows Specials.

You may decide to just Nosh and read a piece whenever the mood strikes you or gorge yourself on a ten-course meal at one sitting. Whatever tack you use, it's great. Try it—you'll like it!

One of my favorites is Rick Meyerowitz's Digital Deli map of Personal America, a fantastic distortion of our country as viewed by personal computer nuts. The vast rift of Silicon Valley runs from the west coast capitals of Sunnyvale and Cupertino all the way to Texas and Silicon Prairie cities of Lubbock, Dallas and Houston. Then there is Florida with Orlando and Boca Raton and smaller places called Tamper and Mango. Off the coast are The Keys (QWERTY) and north is Mylanta then McLean with nearby small town of Washington. This is the entrance to Silicon Alley which extends through Philly, Valley Forge, New York, New Joizey, Boston and on to Peterbrough. There is a lot more, but you get the idea. I want one for my office wall!

Not all is funny. Articles like "Bringing Up BASIC" by its creators Kemeny and Kurtz and "The Right To Know" by Thomas Christo on computer law are only a couple of the serious articles that will educate and inform you. ●

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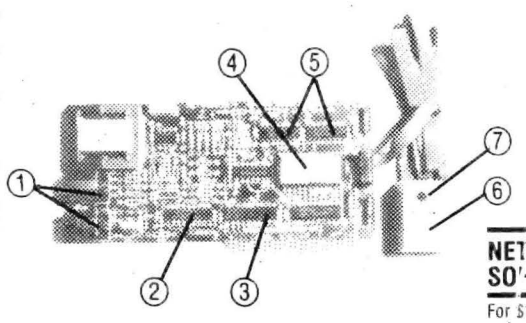

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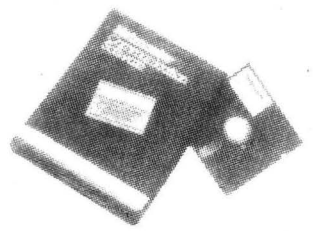

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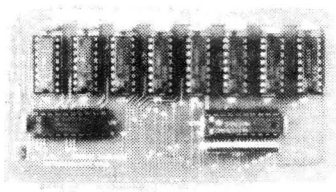

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New Protocols From Intel And Microsoft Aim At Network Standardization

Intel Corp. announced that it has jointly developed with Microsoft Corp. of Bellevue, Wash., network software protocols that allow files to be shared concurrently by multiple users on a local-area network (LAN).

The new network protocols are fully compatible with IBM's PC Network. The protocols will be made available to the public by Microsoft and can be implemented with various operating systems to allow networking of dissimilar microcomputers. The protocols will be available through Intel for its own customers.

The protocols are the basis of Microsoft's new networking product, called Microsoft Networks. Microsoft Networks is software that allows network file access among various microcomputers using the MS-DOS operating system. Microsoft Networks is available immediately from Microsoft.

Starting early in 1985, Intel intends to provide networking products for its key operating systems based on the new network protocols. The first implementations will be under iRMX and Xenix. (iRMX is Intel's real-time, multitasking microcomputer operating system; Xenix is Microsoft's version of the Unix multiuser operating system.)

The protocols will be used by original-equipment manufacturers (OEMs) building networked microcomputer systems for a wide range of applications, including software development, transaction processing and data collection. The new protocols are hardware-independent-- they can support a wide range of network hardware and microcomputers, including systems based on Xenix, iRMX, PC-DOS and MS-DOS.

The new protocols address the upper layers of the International Standards Organization (ISO) network reference model. (This model serves as a framework for standardizing communications systems; it breaks network protocols into seven independent layers, each with its own set of hardware or software functions.)

"These network protocols eliminate hardware and operating-system barriers to networking dissimilar computers," said vice president and general manager for Intel's Systems Group. "We expect the protocols to become an industry standard for local-area networks."

The protocols come at a time when the local-networking market has been fragmented by a variety of proprietary network protocols. A number of vendors offer LANs that work with a restricted range of equipment, but until now there have been no network protocols that were "open" -- that is, available for use by multiple manufacturers. Computers on such networks will have complete access to all shared files, which can be processed as though they resided locally on each workstation.

The new protocols are compatible with Intel's current standard LAN products; these products are available today to OEMs to build networked systems.

For further information contact Intel Corporation, 3065 Bowers Avenue, Santa Clara, CA 95051, (408) 496-7735.

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A multifunction expansion card that adds up to 4 megabytes of memory to the IBM PC-AT personal computer—one megabyte more than the 3 megabyte expansion available for IBM itself—has been introduced by Profit Systems, Inc.

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Tascmaster and the AT Power board make one AT worth nine. It divides the system memory into independent sections and allows practical use of memory above 1 megabyte by executing applications in that space.

The PSI product duo should be especially popular for users who need to work on more than one spreadsheet at a time.

AT Power will also be available with Multi-Tascmaster which enables one PC-AT to become a multi-user system with the addition of inexpensive terminals. It uses PC DOS, not Xenix.

AT Power's base configuration has 128K parity checked memory. I/O ports include both serial (switch selectable) an parallel ports as standard features and an optional second serial port and/or game port.

AT Power is backed by PSI's standard five-year warranty. Base price is $495.

For more information, contact Profit Systems, Inc., 4655 Old Ironsides Drive, Suite 400, Santa Clara, CA 95050.

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PC-Dial/Log Phone Management System

by Andrew Fried

A Vice-Principal hands a list of names to his secretary. Within minutes, she has entered the names into the IBM PC Computer. Keystrokes later, the machine begins to call each of the homes of the absentees.

Meanwhile, back at the home of John or Sally Student, the phone rings. Mr. or Mrs. Student hears the phone and answers it. "Hello". There is a momentary pause, then the voice on the phone says, "Good Morning, this is a pre-recorded message from Anytown High. We are calling to inform you that your child is not in school today. If absent due to illness, please remind your child to bring a note to school upon his return. If you suspect your child is truant, please wait until the end of this message and press the number 0 on your touch tone phone. You may then leave a three minute message. If you wish to hear this message again, please press the pound sign button to the right of the zero.".

A half hour later, the operator returns to the IBM computer and plays back any messages left by the parents. Using her #2 pencil, she makes notations on the list given to her earlier. The old list is purged and made ready for tomorrow; the messages are then turned over to the Vice Prinicipal.

A PC WHAT?

The situation I just described is true, and typical of a new digital audio technique. Now, the IBM PC is being used in a new digital recording application which is being referred to as Personal Telephone Management. The package of hardware and software, manufactured by CMC International, is called PC Dial/Log and consists of a single board (for installation in one of the available full length slots in the PC or XT), a short modular phone cord, a diskette containing the Personal Telephone Management (PTM) software, and a manual in the form of loose-leaf papers (for inclusion into your IBM manuals).

Installation of the unit is as simple as sliding the board into a vacant slot, plugging your phone line and telephone into the back of the card and booting up the program! Just that simple.

The unit is designed to be run on an IBM PC, XT or compatible having a minimum of 192K of memory, at least two floppy disk drives, or one floppy disk and one hard disk and PC-DOS 1.1, 2.0 or 2.1. The version I tested definitely would not work using DOS 3.0. You also must have touch-tone telephone service with modular jacks.

A Voice Digitizer

In case you are wondering what is the purpose of the card, it converts digital data into audio frequency signals just like a modem. However, it is designed to take voice input, digitize that input onto your storage medium (floppy or hard disk) and subsequently retrieve the data and reconvert it into voice. And I must say it does it very well.

Hello human, this is Mr. User's computer calling, please call him to the phone I have an urgent message for him! When Joe User types his ID code into the phone buttons, the computer repeats the message in the actual voice of the person who originated the message! Not the year 2000, it's the PC Dial Log system available for your PC now! Andy Fried reviews this voice management software for you.

So well, in fact, that you cannot tell that you are talking to a computer; the voice messages sound exactly like the person leaving it. In order to obtain such realistic sounds, the voice samples are analyzed and recorded to the tune of 3500 bytes per second (that is equal to about 28,000 bits of data per second or 28K baud).

The significance of this lies in the fact that even with a ten megabyte hard disk dedicated strictly to PC Dial/Log, you would only have room for about 25 minutes of digitized voice recording. While there are ways to utilize the program on floppy disks, to do so would be somewhat impractical because you would have less than 2 minutes worth of storage time available.

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Fried continued from page 25

with PC Dial/Log can be used as an overgrown answering machine. Operating under this mode, the computer would answer an incoming phone call and play a pre-recorded message (called the Greeting). Using commands generated from any touch-tone telephone, the caller even has the ability to replay the message, cancel the message, and leave his own message.

When the software is installed on the computer, you can specify the length of the incoming messages or totally eliminate them (necessary if you are working from floppy diskettes). Also, because you may have numerous messages stored on your disk, you must specify which greeting you wish used.

If you have set the option allowing the caller to leave a message, the system will automatically stop recording if the system detects 5 seconds of continuous silence, the system detects 5 seconds of continuous activity (resulting from a steady dial tone), the caller presses the cancel button (*) on his telephone, or the recording reaches its time limit.

Multiple Messages

One of the powerful features of this mode is that you are able to record several messages and assign them a number. When a caller is connected to the system, he could be given a greeting such as, "Thank you for calling the Acme Widget Company. If you would like information concerning upcoming sales of men's clothing, press 112 followed by the pound key. For information on holiday store hours, enter 231 followed by the pound key." Under the current version of the PTM, you may record up to 20 different messages for playback.

Beep-Through

Another useful feature is called "beep-through". In this case, the incoming call is answered and the outgoing greeting is played as usual. While the message is playing, the caller can enter his secret beep-through code which will result in the message being stopped and the speaker on the PC will begin to beep. Also, a message on the PC's screen will indicate a caller is waiting. The computer operator need only strike any key and he will be connected to the caller.

This feature would be really handy if you were a movie theatre with a single phone line. Normal callers could call and get show information but employees or authorized callers could still reach you. It would also be nice for after-hours workers in a business; callers would get the "answering machine" but wives or bosses could get through in an emergency.

Call Forward Feature

The good gets better! Let's say that you are on call at work for some reason or another, but your wife reminds you that you were supposed to go over to a friend's house for cards that evening. No problem! You can instruct the PTM software to take a message and then call you at another number. When the Dial/Log calls you, it will play a prolog (same as a greeting) and ask for an ID number to insure that no one

Continued on page 27

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Fried continued from page 26

besides yourself gets the message. If the ID number is correct, Dial/Log will play back the message and hang up!

An example? Sure. You're playing Uno and were unfortunate enough to be paired up with your wife. You can't wait to get out of the game, then suddenly your host's phone rings. He answer the phone and hears, "Hello human, this is Puter the Computer. I have an important message for my master. Would you be kind enough to call Mr. Fried to the telephone and ask that he enter his security identification to me? Thank you, human." A puzzled host calls you to the phone and informs you that some kook that sounds exactly like yourself is calling to give you a message and that he/she it needs some kind of password. You enter your password on the phone and Puter gives you the message. You then spend the next 15 minutes trying to explain to your hosts who Puter the Computer is! By the way, make sure your host has touch-tone service or you won't be able to enter the password!

Auto Dialer Mode

The PTM software has the capability of automatically dialing a phone number and responding when the call is completed. When you request this option, you are given a choice of either inputting a name or phone number.

If you enter a name, the program goes to its phone directory and searches for a match. If it is unable to find one, it assumes that you have entered a phone number and it will attempt to dial it. Once the number is dialed, it will ring the number a specified period of time (also part of the installation) and if the phone is answered, it signals you to answer. If not, it merely hangs up.

Originating Multiple Messages

Probably no other single feature of PC Dial/Log is as impressive as is this one. Using your PTM software, you can create lists of up to 150 people and their phone numbers. When given the command, the system will automatically begin calling everyone on the list, paying attention to time restrictions, busy signals and no answers.

Once contact is made with the party, a prolog message may be given which asks that the person be placed on the telephone and that once on the phone he press a certain key on the telephone. Once the person presses the key, the message is played.

Additional programming instructions enable you to either get a voice message from each person contacted (disk space permitting) or allow the caller to respond to a question using some code. For example, if you were a club reminding people about a meeting, after the message was delivered you might ask that they enter a "2" if they can attend, a "4" if they will be late or an "8" if they won't be able to make it.

It is this one area where I have my only real complaint. In order to create phone lists of up to 150 people, you must manually enter them in dBase. If you happen to have a membership roster set up in dBase file there is no way to transfer the information from one program into another. This is one feature that is sorely lacking by the current version of the PTM.

Remote Control

Using a series of commands and passwords, PC Dial/Log can be programmed remotely. Included in the package are a few cards which provide a summary of the commands used for remote control.

From any telephone, you are able to issue the following commands to your PTM system:

1 - Listen to calls
2 - Turn call forwarding On/Off
3 - Turn auto calling On/Off
4 - Erase old calls
5 - Change your call forwarding phone number
6 - Leave a private message for an individual
7 - Record a new greeting
8 - Turn phone monitoring On/Off

Computer-To-Computer Communications

Not only can the computer contact you, but the two computers can even talk to each other! When PC Dial/Log is configured to respond to computer-to-computer communications, two systems can communicate together and transfer all messages for each other. When completed, the connection is ended.

Future Planned Enhancements

CMC is also working on a revision which will allow you to use PC Dos 3.0. Also under development at this time is a concurrent version which will enable you to run PC Dial/Log in the background, while at the same time using your system for other purposes, in the foreground. This would be a real boost to the program as it would allow full implementation of the PTM system without the need to dedicate one machine exclusively to it.

Conclusion

Despite my attempts to cause it to crash, the unit I received for evaluation performed flawlessly (after I used the correct version of DOS). My only real disappointment was that the phone directories used by PC Dial/Log had to be manually entered; it would be nice if, for example, an existing Dbase file could be created which could then be used by PC Dial/Log as a distribution list. I certainly hope that CMC will pursue this enhancement in future updates.

Another thought for CMC might be to manufacture the unit as an external device that merely connects to the RS-232 port. With a limited number of

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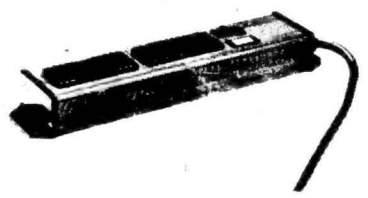

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slots available on a PC. the addition of another serial port is easier to accomplish than is the addition of another slot.

The heart of the system lies not with the hardware board but with the software which accompanies it. With it. you are able to get PC Dial/Log to perform many different tasks individually tailored to your specific application.

Interest in this new application for the PC is growing. Although the product has been available for some time. it wasn't until recently that CMC has been able to successfully place it in stores. I have learned that Entre Computer stores will not only be marketing the item. but they will have exclusive rights to the concurrent version for the first 30 days after its release.

It will be interesting to see what application purchasers of PC Dial/Log find for the device. Already. schools are using it to call homes of students that are absent. Clubs are buying it to remind members about meetings or special events. Businesses are using it to call delinquent accounts or notify its customers of upcoming sales. Doctors offices are using it to remind patients of their appointments. Large corporations will find it valuable as an inhouse email type service. And the list goes on.

I feel quite confident in highly recommending this product. The documentation is good. the product works well and the software is well written. The unit retails for $595 which makes it a good value.

For additional information contact: CMC International. 1720 130th Avenue N.E.. Bellevue. WA 98005. 1-800-262-4685 ●

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by Bill Chin

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One possible tool is the Value Line's investment criteria selection tool VALUE/SCREEN. Its usage is on either IBM-PC or APPLE compatible computers. It attempts to sort and scan through almost all of the stocks which are listed on the major stock exchanges to search for the most matching stocks which may fit your selection criteria. Basically its like a spreadsheet application with "what if..." selection which each query narrows a listing from the Value Line's data base for you to work from for your possible investment portfolio.

Its intended as a programming tool which allows the private investor, financial analyst and stock specialists who manage money investments. Volatility and risk is your selection as is what industry groups (93 of them) which you might want to be diversified into. This is basically a COMPACTed data base from the Value Line Investment Survey which maintains an independent advisory service from all the financial information such as history, ratings, earnings reports for over 1700 listed stocks in the stock markets. They list the companies relative to Timeliness and Safety Ranking in the market.

The Value Line Investment Service offers the Value/Screen package to the IBM-PC user either the 2 diskette version for PC-XT/AT user and 3 diskette for the floppy disk user. The PC-Jr user needs the second drive and at least 64kb memory. The IBM printer is optional but advisable.

The Value Screen data base is composed of differing vital statistics in their Stock Selection Menu screen which is accessed from the Opening Menu.

How to get rich in the stock market, its simple when you have a personal computer. All you have to do is Buy Low, Sell High. Will any of the hundreds of the stock market analysis programs help you? Read Bill Chin's review of yet another stock market investment tool and find out.

The Opening menu:

Menu of Selections

1. Begin Screening
2. Add Parameters
3. Delete Parameters
4. Report on Stocks Selected
5. Statistical Analysis of Stocks selected
6. Portfolio Analysis

Enter Selection: [ ]

When you enter the Begin Screening...
you will be clearing the workspace area which is the Report and Portfolio area. All previous work is purged or erased.

Add Parameters...
You can revise the current screening or portfolio analysis by adding a criteria through which you may increase or decrease the stocks under review.

Delete Parameters...
As in Add Parameters, what will change is the selections criteria.

Report on stocks Selected...
Through the selections the stocks selected in the workspace area can display to either the printer or the display. If you select a device and its not there..eg printer it hangs the application, you have to start all over again.

Statistical Analysis of stocks selected...
You can get a statistical analysis of the full data base or the selected stocks in the workspace. It presents the sample size, mean, variance, standard deviation, and range of whichever variable is selected.

Report on a Specific Stock...
It displays the data base information of the stock which is selected. You will need the ticker symbol to use this function.

Portfolio Analysis...
This selects another product of Value Investment Service. Its the portfolio Management package, it allows saving the work selections or making adjustments of your prior stock selections. These selection lists can be recalled for review or refinement in the other menu selections. When selected it calls the user to enter the portfolio diskette, then it transfers control and does not destroy the workspace area.

If you select the Selection Screen you will see the following items of the Value Line Data base appear. Currently the Data base is upgraded as a monthly, quarterly and annual service for a fee. It is now being upgraded for daily up to the minute update service... on-line services to some degree...

Stock Selection Screen

Menu item #1 Timeliness Ranking runs from 1 thru 5 during the next 12 months where the:

RANK
1 - Highest - Best Performance than market (mkt)
2 - Above Avg - Expect better than average
3 - Average - With the market
4 - Below Avg - Expect below - avg
5 - Lowest - Expect poorest relative to mkt.

Value Line expresses stocks ranked at 1 (highest) as the best selections for the typical investor as long as one keeps in mind the safety rankings.

Menu Item #2 Safety Ranking

RANK
1 - Highest - Safest, least risk, most stable
2 - Above Avg - Safer, less risky than most
3 - Average - Avg safety, risk
4 - Below Avg - Riskier, Less safe
5 - Lowest - Above Avg Risk, Least Safety

Other Menu Items #
3 - Industry Rank
4 - Industry SIC code
5 - Financial Strength
6 - Price Stability
7 - Beta (rel. to NYSE Comp)
8 - Option Indicator
9 - Recent Price
10 - Current Price/Earnings
11 - Current Dividend Yield
12 - Price to Book Value
13 - 3 month % price change
14 - 6 month % price change
15 - Market Capitalization
16 - Annual Sales
17 - Debt to Capital ratio
18 - % Return to Net Worth
19 - % Retained to Equity
20 - 5 yr Earnings per share
21 - 5 yr Dividend Growth
22 - 5 yr Book Value Growth
23 - Last Qtr EPS % chg.
24 - 12 mo. EPS % chg.
25 - % chg 1st Qtr EPS
26 - Est. % chg 2nd Qtr EPS
27 - Est. % chg Fiscal Yr EPS
28 - Projected EPS growth
29 - Projected Dividend growth
30 - Projected 3 to 5 yr Book Value Growth
31 - 3 to 5 yr % appreciation
32 - 3 to 5 yr avg annual rtn
33 - Company Name
34 - Ticker Symbol

Portfolio Management

When selected the following menu appears:

Portfolio Management
& Analysis
Menu of Selections

Continued on page 29

SERIAL SUPPORT ONE SMART SOLUTION FOR:
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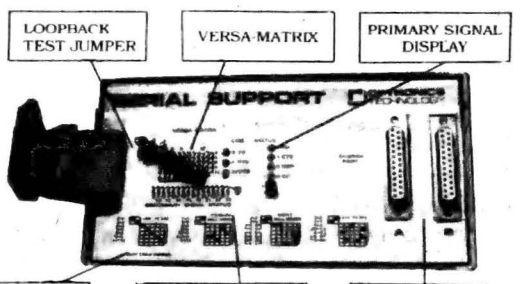

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OPTRONICS TECHNOLOGY

Natural Microsystems Extends Watson® Compatibility To IBM PC/AT

Watson, an integrated voice/data system that gives the IBM Personal Computer and PC-compatible computers sophisticated personal office automation capabilities, now can be used in IBM's new Personal Computer Advanced Technology (PC AT) computer systems.

The PC AT is a multi-user system that operates at higher speeds than previous IBM PC models. Watson can operate under the DOS 3.0 operating system, the AT's primary operating system.

"Because the PC AT is IBM's computer system of the future, it was important to enable Watson to run on it, said vice president of retail marketing. "Because of Watson's design, only a few modifications to Watson's system software were needed to add PC AT compatibility." He said there will be no change in Watson's price. The modifications were incorporated in all Watsons manufactured.

Watson already runs on the IBM PC and PC XT personal computers under the DOS 2.0 and 2.1 operating systems.

Watson is made up of a single printed circuit board, system software, and application software. It uses state of the art digital signal processing to allow the computer, combined with any touch tone phone, to become:

- An electronic phone book and data base that stores in a card file format hundreds of phone numbers and additional information,
- An automatic telephone dialer,
- A personal voice mail system that accepts messages from callers, and leaves individual messages for specific people,
- An automatic time billing system that allows professionals to track the time they have dedicated to a job,
- An electronic voice calendar and date book that records appointments and can automatically place a call to remind the user of an appointment in his or her own voice,
- A dictating machine that lets users edit and rearrange a message before it is transcribed, and
- 300 and 1200 baud modems.

Watson can be used either locally, through the computer's keyboard, or remotely, using the keypad on a touch tone telephone.

Watson's list price ranges from $849 to $998, depending on the modem's speed. Watson is available in selected computer stores.

For further information contact, Geithner/McGowan, Inc. (617)875-3821.

Mention that you read about it in the Computer Shopper. ●

Chin
Continued from page 28

Create a List
T - Ticker List
P - Portfolio List
C - Convert Ticker List to Portfolio List

Modify a List
A - Add Stock(s)
R - Remove Stks
M - Monthly Pricing
U - Update Info

Portfolio Reports
I - Info Summary
V - Valuation Rpt

Storage Functions
S - SAVE list to DISK
L - LOAD list from DISK
D - DELETE list from DISK
F - FILEs listing on DISK
E - EXIT to MAIN menu
Enter Selection: [ ]

This module allows you the user to Create, Modify, Store, Delete, Retrieve a Stock Ticker list from your computer. It allows you to monitor your own selected portfolio even if you didn't invest any monies.

Its a self prompting user system for processing your selections without learning programming. Its totally turnkey as we would say in the computer industry.

Overall its a very good stock productivity tool for its cost... even through its not up to the minute as in a ticker tape..

For those programming fanatics... its a UCSD 'P' Pascal application which also adds problems for those non-standard IBM-PC personal computer configurations. If you have a PC/MS-DOS customization as I did you are left out in the cold... brr...brr.. Not being a UCSD person there are no notes of who to configure my system printer to the application which was serial not parallel nor my hard disk which is customized.

It brings up the traditional problem which I have noticed in this IBM-PC industry is that the loadable driver customization causes problems for those users of turnkey systems. Just as much is another problem... How do I backup my diskettes let alone my selected stocks in the portfolio?

I may not have spent the $695 for the IBM version of UCSD "P" Pascal, therefore I can not help but worry about my lists. I can't use the stock data due to the non exchangeable data media to PC/MS-DOS environments except through modems. But here we go again who puts in the modem interface...(remember 1-2-3's upgrade to symphony).

Documentation is greatly simplied but for a "knowledge" stock investor. I recommend that you have a talk with your stock broker if you're not familiar with the terminology. It is good to learn or simulate a strategy without the spreadsheets but with an actual live data base from the prior close of the exchanges.

This is currently a 60 day trial period for the package at $215 and may probably be the best dollar per dollar investment in "stock investment" software at this current time (as of 11/1/84).

The materials currently are available for IBM-PC, PC/XT, AT, XT, Apple II, IIe, IIc and soon PC/Jr and Macintosh versions will be on the market by 1985. When you write for information... say Computer Shopper referred you.

For information write: Value Screen, 711 3rd Avenue, New York, NY 10017. ●

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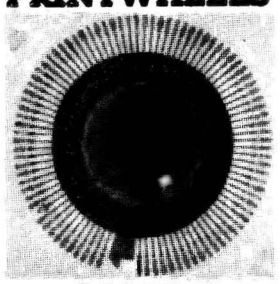

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TenKey Calculator Utility Review

by Andrew Fried

Get the most out of what you have. No, this isn't a pep talk given by a high school football coach; it's a long standing tradition among serious computer users and hobbyist. You see, a long time ago when memory was expensive and machines could only have up to 64K of RAM, computer memory was precious. After the operating system took up its portion of memory the balance of available RAM was reserved for code and data.

Ten years later the picture has changed. The machines are now coming equipped with 640K to 3 megs of available RAM. Even with today's large integrated software packages that is a lot of memory for one machine. So when you load the DOS and your applications program and you find you still have 300K of RAM free what do you do with it?

Many innovative programmers are trying to use the excess RAM for utility programs that remain resident in memory. These programs are most often loaded after the operating system is booted-up and before any application programs are run. Using some tricky interrupts, they allow you to be in a program, jump out and run the utility program and then resume execution of the original application program. The most famous of these integrated resident utility programs is, of course, Borland International's, Sidekick.

TenKey is another useful resident utility program that allows you to use your computer as though it were an overgrown business calculator. These "accounting calculators" are also referred to as "ten-key" machines, hence the name of the program.

TenKey is a single purpose utility which requires 22K of available RAM. If you don't mind loosing one of the graphic features available on TenKey you can reduce the memory requirements to a mere 9K. Once loaded, it remains dormant until called up by pressing the control and escape key simultaneously.

A built-in calculator lives in the memory of your computer, ready to use at the push of a key. It appears in a window on your screen, allows you to do all the common math functions and even "runs a tape" listing the results of your calculations.

The utility allows you to input numbers in the same manner as you would on the typical calculators found in most offices. Using the numeric keypad and a few other keys surrounding the keypad you are able to perform most common math functions including the use of a constant.

When you call up TenKey, a small highlighted box opens in the lower right hand side of the screen which represents your work area. Unfortunately, the lack of any graphics makes for a functional yet boring screen display. For example, in Sidekick, when you call up the calculator a window opens with what looks and acts like a pocket calculator. However, TenKey does have one feature lacking in most other calculator utility programs; it displays a tape like listing of your previous entries. This is a very nice feature that is not present in Sidekick. This may be a good trade off for the fancier graphic displays.

TenKey has a feature enabling you to redefine certain keys which are used by the calculator. For example, because there is no percent (%) key conveniently located near the numeric keypad, they redefined the 'PrtSc' key to mean '%'. I don't know about most other people, but I find trying to memorize key redefinements far more difficult and time consuming than moving my hand away from the numeric keypad area and hitting the key marked '%'. Furthermore, the use of those sticky little labels that accompany some programs is strictly taboo in my house. But keep in mind that the redefinements can be changed to whatever you wish and for the most part unnecessary (except for functions like M+ for memory key which has no other equivalent).

The documentation accompanying the program is in the form of about 30 loose leaf notebook pages designed to be inserted inside one of the IBM size notebooks. The program documentation is very thorough and should be easy to understand even for a beginner. Included on the distribution diskette is a tutorial which steps you through the use of the program (Sidekick has documentation in the form of online help but requires almost 50K of disk space). I think that between the tutorial and the manual anyone could learn to use the program in a matter of minutes.

In case you are wondering, the program is not copy protected (the standard distribution version of Sidekick is) and comes on one single diskette which contains the program and the tutorial.

I did not receive information concerning the suggested retail price of the program which has some bearing on the overall value of the program. I expect more from programs that cost more; and a review should convey that. I looked thru past issues of PC magazine and found an advertisement showing the price to be $49.95; however that was before Sidekick and a few others released similiar programs (by the way, TenKey is advertised as the original pop up calculator program). The point I am trying to make is that if the cost of the program were still $49.95, I would advise you to strongly consider Sidekick as it has a great many more features. If, on the other hand the price is between $19.95 to $29.95, I wouldn't hesitate to highly recommend it.

For more information on TenKey contact: Photon Software, Post Office Box 1408, Bellevue, Washington 98009 ●

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Concentric Information Processor For The IBM PC

by R.E. DeVore

Concentric Information Processor
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Price: $395.00

The Concentric Information Processor is a data base program for the IBM PC, XT, the COMPAQ and any 100% IBM compatible computers. It will work with DOS 1.1 or 2.0. DOS 1.1 usage requires two disk drives and a minimum of 128 kilobytes of memory. To use the Concentric Information Processor with DOS 2.0 requires two disk drives and a minimum of 192 kilobytes of memory. A hard disk system must have a minimum of one floppy disk drive, the hard disk and 192 kilobytes of memory.

This software is the first product of Concentric Data Systems and if the first product is an apt indication of their future programming efforts, they have an excellent chance for success. This is one product that lives up to its advertising.

I was attracted to the Concentric Information Processor by a demo disk that had just been received at a store that I deal with. It looked too good to be true as I watched it, so I called to request a review copy. I thought that if it was as good as it seemed, everyone ought to know about it. If it wasn't...

After a short wait that seemed to be an eternity, the package arrived. C.I.P. comes in the familiar notebook case made popular by IBM. There are three disks that contain the program, with a backup disk of the main diskette which is protected. The backup disk is a nice touch as a lot of software houses do not do this for you. The diskettes are covered by warranty for ninety days, with a guarantee that replacement diskettes will be available for three years after you purchase the program for a cost of only twenty dollars. All that you as the owner are required to do is send in the registration. I have mixed feelings about a program that costs $395.00 being copy protected, especially one that would become a major part of your library. I feel that if a program has to be protected this is one of the best ways of handling the situation.

Installing C.I.P. is a piece of cake. The documentation takes you by the hand and walks you through the procedure in a step-by-step manner that I feel anyone could follow without problems, based on their using fully IBM compatible equipment. The program may be used with a floppy or with a hard drive. Using it with a hard drive requires that the original disk be inserted during the boot process.

Once the program is running, the diskette is no longer needed, in fact the process takes such a few seconds that it doesn't become a bother. I tried installing C.I.P. on an IBM PC that used a Davong hard drive set-up as well as one that used the IBM controller. The Davong installation was much more difficult because the program expected the hard drive to be Drive C, which was not the case. If you are using a hard drive system where the drive is other than Drive C, it would be better to have the dealer install the program for you. The manual assumes the XT set-up and is not much aid in other circumstances.

C.I.P. is menu-driven with HELP screens available at the touch of a key. The HELP screens are called up by pressing the F1 key. The information shown, is geared to the particular part of the program that you are working with. Should you still have a question after reviewing the initial HELP screen, moving a highlight over a key word and pressing RETURN allows another screen to come up. In most instances there are several levels of HELP screens that may be viewed to resolve any questions.

The excellent documentation supplied with the program is almost unnecessary due to the excellent HELP screens. This manual is one of the easiest to read and understand that I have had the pleasure of working with. The tutorial manual has 200 pages which include both a Table of Contents and an Index. The user is taken keystroke-by-keystroke through the features of the program. Each key referenced is illustrated in the book exactly as it appears on the keyboard. This helps the complete novice to learn the program. There are also many screen photographs throughout to illustrate exactly what the results of your input should look like. At the end of each chapter, the keys and steps used are reviewed.

I feel that this manual should be used as a guide by other software people when they write their documentation. Both the program and the manual show what "USER FRIENDLY" should really mean.

The Reference Manual also has both a Table of Contents and an Index. Each section of this 241 page document has a separator with an index tab to help you reach the information as quickly and easily as possible. Everything is explained in a clear and comprehensible manner. If C.I.P. did not have the HELP screens, the well done manuals would still allow you to run the program even if you had not used a computer before.

Blessed Are Those Who Run Around In Concentric Circles For They Shall Be Known As Wheels! Richard DeVore reviews the Concentric Information Processor for the IBM PC and finds it to be an excellent data base program. While the world may be not exactly waiting for another PC DBMS, Richard says this is a good one.

C.I.P. allows up to 40 fields to be specified. Each field may be set up as you need it, i.e. auto-entry, the length, whether character or numerical, date, calculated, full field, key field, etc.. The program allows date calculations as well as regular calculating modes. Only 20 fields will fit on a screen, after 20 lines the screen scrolls to allow a total of 40 lines to be used if needed. Each field can be a key field with a maximum of 50 characters per field. This allows a maximum of 2000 characters per record. You may have up to 65,000 records per file. The ability to select auto-entry for a field is an advantage. Some programs do not have this feature which means typing in all of the duplicate information, time after time after time...

Once the file has been set up, you may define the screen to suit your needs. It is quite easy to redefine the file to allow adding new items, changing the field attributes, delete items, etc.. Moving from field-to-field is done with the ENTER key, making C.I.P.

Continued on page 32

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Anyone who has ever studied a foreign language remembers the worst part of it: Vocabulary drill and verb conjugation drill. Building a useful vocabulary in a short period of time can be accomplished by one method only: Drill, drill, drill! Despite advances in modern technology, repetitive drill remains the only way to build vocabulary.

Acorn's Language Teacher Series consists of vocabulary and verb conjugation drills for Spanish, French, German and Italian. All except the Italian are in two parts, and present working vocabularies that are educationally sound for the beginning student. On an elementary school level, Parts I and II contain most of the vocabulary that will be encountered in two years of study. At college level, this core vocabulary comprises more than a semester's work.

The program does not attempt to teach pronounciation, nor does it teach conversational German, Spanish, French or Italian. It is designed to drill vocabulary and verb conjugations only, and the variety of drills make it an outstanding supplement to classroom instruction. Teachers can also make good use of its feature to print tests.

When the program is loaded, you are presented with a menu that contains the following options:

The vocabulary drill selected first asks if you want multiple choice. You also have the op-

Continued on page 34

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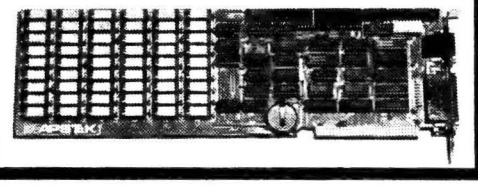

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DeVore
Continued from page 31

much simpler to work with than programs requiring multiple key moves and entries. The exception to this comes at the point when you have finished a record. In order to save the record before beginning the next requires using both the control and enter keys, holding down the control key and then pressing the enter key.

Should you forget to use the control key, the next record that you type in will take the place of the one you just finished. If this is done, the record will have to be re-entered and saved.

Creating special reports that make use of your file data is easily done. You use the cursor to "drag" fields to the required location. This is similar to using a mouse or a digitalizer pad for this function. Although they are not mentioned, I feel that adding the use of these input devices would not be difficult for Concentric Data Systems to implement. This is a possibility for a later release should they feel the customer demand is there. Up to 76 different reports may be saved on a disk for each file which should cover any variety that are needed by your particular application. Once prepared and saved, they are ready to be printed. This may be done on an IBM printer (Epson MX-80), an Okidata or a NEC 3550. Up to two printers may be used, for instance, a dot matrix for some applications and a letter quality printer when that form of printout is required. Should you not own one of the directly supported printers, there is a way to set the program to work with almost any available printer. This should probably be done for you by your dealer if you are not an experienced user.

The report generator allows many features; any field may be sorted and multiple-line headers and footers may be used. The field names may be changed on the report as well as deleted if not needed in the particular report that you are working on. The sorting process while using the report generator is slow. This is in direct contrast to using the Find function on a key field which is quite fast. However, this is about the only thing I could find to complain about in a program that is extremely well done.

A feature that is unusual for this type of file management program is the ability to input data from other programs: Visicalc and Lotus 1-2-3, for example. This is done by converting the Spreadsheet files to the "DIF" or Data Interchange Format. This, as well as converting C.I.P. files for use by other programs, is fully explained in the manual. Not only are you told how to convert programs but they provide you with some explanation of what "DIF" means, a nice touch.

While C I.P. is not a relational data base with the attendant programming language or the ability to work with several files at the same time, it seems to fit the needs of the normal computer user quite well. This is true for small business use as well as home use.

This is a program that allows the user much flexibility. Fields may be added, the length and/or name of a field may be changed, you may even change the characteristics of a field to accomodate changeing requirements. Some of the users that C.I.P. may be put to include inventory, customer files, mailing labels and membership lists. It works with MicroPro's MailMerge to facilitate form letters using Wordstar.

Concentric Information Processor fits into home use as well as business and corporate applications. It is perfect for the user who does not spend all day, every day using a data base and who does not want to relearn a program each time they use it. It seems to be "bug-free" and a delight to use. ●

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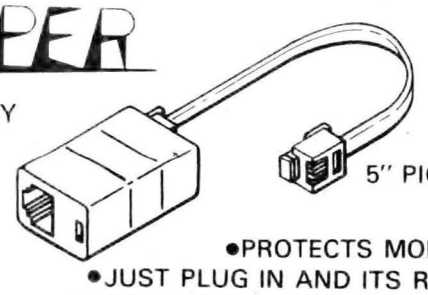

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IBM-PC price is based on a phone quote from the Mesa, Az Computerland on July 30, 1984. Price included 256k RAM, dual 360K drives (800K's weren't available), software, and a graphics monitor.

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The computer scans the Text Files 10,000 times faster than the fastest speed readers and can "remember" and compare everything it reads with everything it has read; saving the attorney and the paralegal tremendous drudgery. The system is interactive and an attached printer can provide detail analysis output for the litigants work file.

More information about SCANIT may be obtained by contacting Brody & Geiser of Fords, NJ 08863.

Mention that you read it in Computer Shopper. ●

Meyer
Continued from page 32

tion of stopping and returning to the menu by responding with an X. (This feature is present throughout all portions of the program, allowing you to stop one type of drill and start another.) You are then asked if you want English to German or German to English (or whichever language you are running).

No word is given twice during the drill, and no duplicates appear in the multiple choices. Because both the target language and English words are selected at random, it is very unlikely any words will appear in the same order the next time the drill is run, even if you have not rebooted the machine. This eliminates the problem of consciously or subconsciously daisy-chaining the word lists. Even after 28 years, when I think of the Latin for "oyster," I think first of "memory" because memory appeared directly above oyster in that first-year textbook.

When selecting the noun drill, if you did not specify multiple choice, you must include the appropriate article with the word you answer. If the noun you are given is "HOUSE," you will be marked incorrect if you respond with "Haus" instead of "das Haus." This is invaluable in learning the gender of nouns.

At all times, you see a progress report telling you your percentage of correct answers. After completing the drill, or stopping at any point by entering an X, you may retest on any words or phrases you missed. If you have answered a question incorrectly, you are given the correct answer. It is also a real-time program; hesitate too long, and you are rewarded with an incorrect reply, and your percentage of correct answers goes down.

The <H> option lets you review your incorrect answers, and even displays an asterisk beside person or tense in the verb drill to indicate you need more practice if you've made three or more mistakes. If you have not completed all the possible combinations, it tells you how many remain, and you may return to the drill.

The program does not keep a permanent record of your results, and any youngster who achieves a high level of proficiency (hopefully even seeing "Congratulations! You made no errors!" on the screen) will want to be able to prove it to his classmates or parents. The <PrtSc> function will copy the screen to the printer, and the proof is there for everybody.

Accented vowels and special characters which do not appear on the keyboard are provided in each language by the function keys. Words such as "facon, "Hauser" and "da B" can be entered as well as displayed. (The Radio Shack versions do not have this feature, because these special graphics are absent from character set.)

The Print Test options randomly select all the possible combinations, and give you the choice of printing, skipping, or exiting. The printed quiz is numbered consecutively regardless of the number of selections you skip. With multiple choice, because of the randomness of selecting the choices, I printed 10 different tests of phrases. Each test contains 20 questions, with four choices. Three of the phrases had two matching answers, but they were in different order.

Acorn packages the programs in attractive snap-shut book-style binders that match all of their programs. The instruction booklets are brief, but clearly written, telling you how to install an operating system on the disk, get it up and running, and explain each of the options.

I did find some typographical errors in one of the packages, but had no difficulty correcting them by editing the offending lines. This brought me to my first complaint with the series. They are written in BASIC, and have not disabled the <Break> key. Show me the child of six or seven who won't experiment with his keyboard, and I'll show you one who'll never benefit from a computer. With <Break> disabled, little fingers won't lose the program in the middle of a run.

My other objection is that there is no provision on the menu to exit the program. No damage will result from rebooting, but good computing practice teaches you to exit a program before shutting down. One more selection on the menu should return to A>.

Even with these two minor annoyances, as a former teacher of foreign languages, I can highly recommend these programs to anyone who is studying a language, or who wants to brush up on weak vocabulary before traveling abroad. If Junior is just embarking on his study of a new language, these programs could well be the most valuable packages this year. ●

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GATO Submarine Simulation

by Karl H. Meyer

Among the simulation games available for the IBM PC computers is one that is rapidly gaining popularity. GATO is a realistic simulation of Pacific Fleet submarine warfare against the Japanese. The programming by Ed Dawson and Paul Arlton is superb, and the accuracy of the simulation is largely due to the first-hand knowledge of GATO submarines by Capt. Bill Dawson (U.S. Navy, Ret.).

You are the captain of a GATO-class submarine in the Pacific during World War II. While running on the surface at night to recharge your batteries, you receive orders for your next mission: Destroy a number of Japanese cargo ships in the vicinity of an island where intelligence reports heavy buildup of troops; a large number of Japanese warships are reported in the area. You are alone and have no help on this mission. Your PC is transformed into a submarine's main control room, and the display shows you the control panel and the view from the bridge or through the periscope.

The instrument panel displays the depth, speed and compass heading of your sub, along with indicators for the amount of oxygen remaining, battery status, number of torpedoes remaining, and damage reports. Separate screens are called to navigate by radar, charts of the area of operations, captain's log, and other functions. The damage report, for example, displays a view of your sub with damaged sections in red.

Die-hard arcade gamers will find GATO slow, but the simulation is a real-time adventure, and requires you to exercise judgement and strategy far beyond that of moving rapidly and firing an inexhaustible supply of missiles. Once you've fired your 24 torpedoes at the enemy, your only recourse is to retreat and find your subtender; this can be tricky in enemy-infested waters, particularly if you have suffered any damage to your craft. If your engine room or conning tower have been damaged, you'll be lucky to escape with your life.

The program includes a history of the GATO-Class subs, and lists the targets you will find in various missions. All are actual Japanese craft sunk by GATOs during the war. I've been playing with GATO for several months, and haven't gotten all of them yet. To be honest, they've sent me to Davey Jones's locker more than I care to admit.

If you're an old hand at Flight Simulator, you are aware that the game is played in three dimensions rather than a flat playing surface. GATO does the same thing in the water. If you're not careful, you'll wind up explaining to COMSUBPAC why you grounded your vessel on a reef, and were stuck high and dry while the Japanese fleet moved in on you. (Actually, you'd be lucky if that happened, for in the reality of the game you won't live long enough to make any report.)

The game area seems as vast as the Pacific itself. Of the 20 quadrants that make up the play area, four are occupied by allied forces, and two are "relatively" neutral, which means enemy ships are seldom encountered there. After you have played through the adventure a few times, you are lulled into a false sense of security, and might find yourself cruising on the surface at 20 knots without being aware of the Japanese destroyer bearing down on your port beam. After you lose a few subs, you will learn to keep a close watch on your radar screen, which can spot ships long before they are seen through the limited view from your periscope.

Because you can set the difficulty level from 0 (easiest) to 9 (frustratingly difficult), and because your missions seem to be randomly selected from the large number available, GATO offers not hours of play, but weeks or months without repeating the scenario. Some of the realistic aspects of the game are seen in the action of enemy ships, which may turn and run rather than attack.

You may decide at any time to scrub the mission and ask for another, or wait until you have completed it successfully. Your success is determined by the tonnage of ships sunk and the number of missions completed. You can fudge a little, and ask for another mission, but if you have suffered any damage or are out of torpedoes, you must still get to your tender. When all else fails, you can press ESC and abort the game, able to start again with a clean slate. Successfully completed missions will be saved to the Captain's Log, and you can return later for others, and continue until you have sunk all the enemy ships. I haven't made it to that point; the total tonnage of subs I've left on the ocean floor is roughly equal to the tonnage of Cessna 182s I've

Continued on page 38

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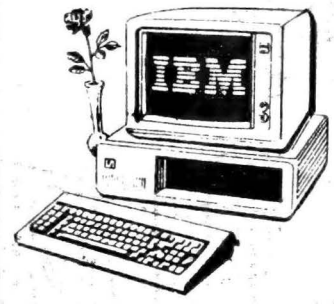

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New Communication Software For Osborne Computers

Communique Corporation announces the addition of CQ-3780 and CQ-3770-SNA to its current line of communication software. Both products retain the same high degree of user orientation currently available with their CQ-HASTE (HASP Station Emulator).

The addition of these two new products gives users of virtually any microcomputer the capability of communicating with other micros, minis, or mainframes and permits fully error checked binary or data file transfer at speeds ranging from 1200 baud to 56 KB depending on hardware capabilities.

CQ-3780 and CQ-3770-SNA are menu driven with in-context help screens that facilitate ease of use for both the novice and expert user. CQ-3780 communicates in IBM's 3780 bisynchronous protocol and CQ-3770-SNA is a comprehensive emulation of IBM's 3770 SNA/SDLC product offering.

Additional features include: built-in text editor; local disk operations; simultaneous redirection of incoming data to disk, console, card punch, or printer; adaptation to host or remote status; and built-in password security for public sites.

All products will operate on CP/M, CP/M+, CP/M-86, Concurrent CP/M-86 and MS-DOS based systems that include synchronous communication options.

Deliveries for CQ-3780 will begin in January and CQ-3770-SNA will be available in the 2nd quarter of 1985.

For more information, contact Communique Corporation, 1535 Killearn Center Boulevard, Bldg. D, Tallahassee, FL 32308.

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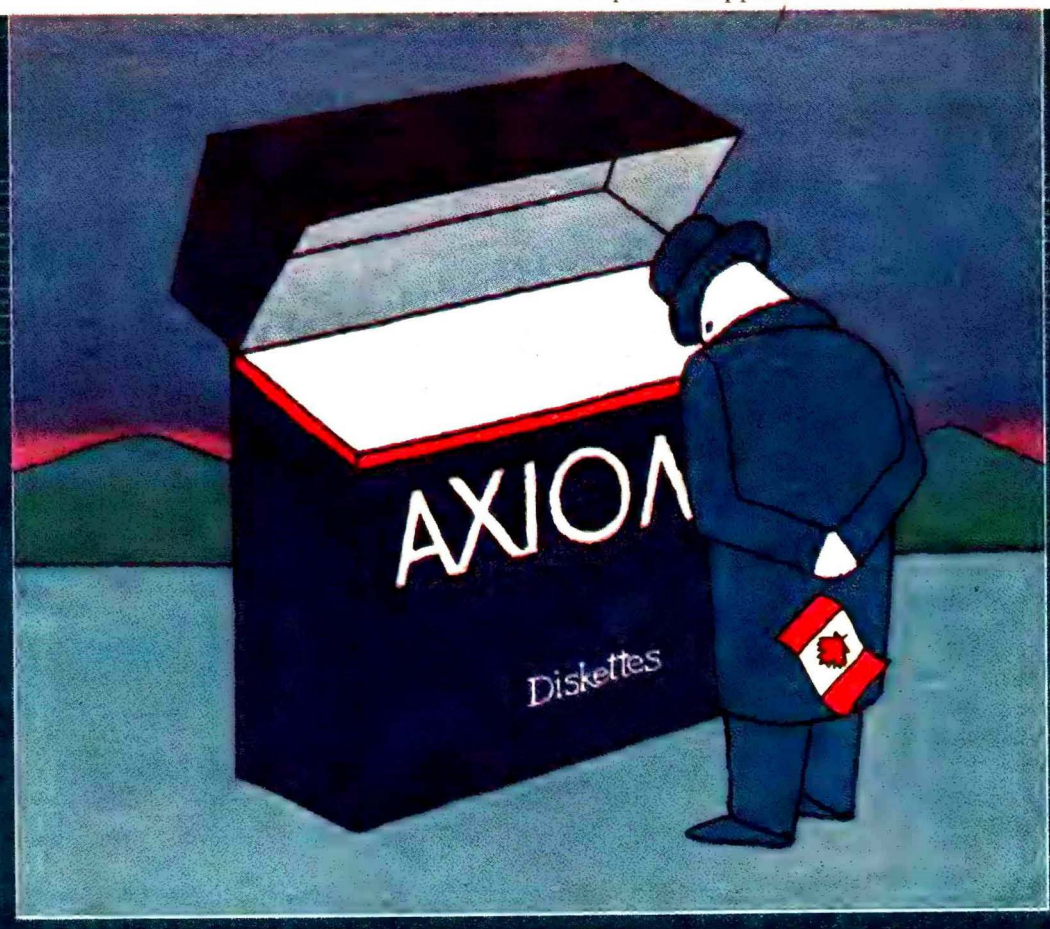

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Enertronics Research, Inc. now offers an exceptionally capable graphics software workstation for business analysis and presentation graphics, computer-aided design and more. EnerGraphics for the IBM PC (and compatible systems) is available for $350 (all prices suggested US resale at participating Enertronics dealers), a plotter support option for $100 and a demonstration disk for $15; dealer and OEM inquiries are invited.

The list of EnerGraphics capabilities is remarkable. It can create and display or print line charts, pie charts and two- or three-dimensional bar charts; floor plans, maps, electronic circuit diagrams, mechanical and architectural drawings; detailed two- or three-dimensional drawings, surface diagrams and engineering models; fanciful graphic character sets, symbols and icons; slide shows and more. The wealth of talents in this graphics "department in a box" is easy to command, thanks to its simple menu-and-options organization and thoroughly interactive operations. And EnerGraphics supports high-resolution color or monochrome displays and most popular dot matrix printers.

EnerGraphics offers a shortcut for rapid data entry: a data conversion facility that can read many popular spreadsheet files directly (including files from VisiCalc® , Lotus 1-2-3® , Multiplan® and most DIF® -compatible files), then select information within a spreadsheet for charting. Spreadsheet information can be edited, new information can be added or data can be entered directly from the keyboard. In many cases, a bar, pie or line chart can be produced directly from data, with little or no operator assistance; in every case, users can modify almost every detail of any chart.

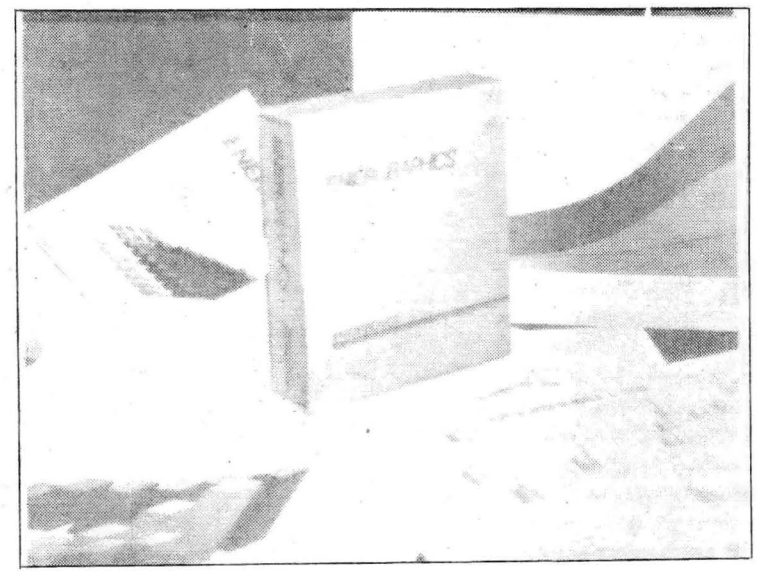
Pie charts can present up to 15 slices, any or all of which can be offset from the pie. Bar charts can be presented horizontally or vertically, as side-by-side or stacked bars, and as two- or three-dimensional bars. Line charts offer log scaling, multiple scales and five types of line fits, including linear and polynomial regression.

Line graphics and drawings are easy to produce, modify and present with the powerful graphics editor built into EnerGraphics. Whole symbols can be brought in from templates or lines drawn between points. Function keys bring control over line thickness, scale, rotation, position and more. Drawings can be stored and recalled, even modified and stored again under a new name; in this regard, EnerGraphics does for graphics what word processors do for text.

Symbol templates make drafting with EnerGraphics a breeze. Symbols are easy to create or modify, and a library of prepared templates is included. Prepared templates offer nine lettering fonts; special character drawings, electronic schematic diagrams, data processing flow charts and more. EnerGraphics supports 60 templates of 38 symbols each, for up to 2280 user-definable symbols in all.

Users can design their own symbols and create new templates. Symbols are defined using a 24 x 24 grid; they can be rotated or scaled. This capability lets EnerGraphics open shortcuts to many applications: chemical process symbols, musical symbols, printed circuit layouts and so on.

Three-dimensional surfaces can be plotted from functions or data-point entry. Data can



Energraphics by Enertronics Research

be inserted and edited or deleted at will, as can X, Y and Z axis labels. Most impressively, every aspect of viewpoint can be altered; table and elevation angles, point of origin, scaling of each axis and more.

Three-dimensional objects can be represented as "wire frame" constructs, using point, line and plane definitions; while this may sound complicated, it is as easy as a child's use of pipe cleaners or stick-model toys in constructing a frame that outlines a 3-D object. EnerGraphics can also zoom or rotate the view of a vide-frame 3-D object, and hidden lines can be removed from view.

Finally, EnerGraphics can save screen graphics as "slides," and slide files can be invoked in any desired sequence using a special, easy-to-make slide show control file. EnerGraphics slide shows can be self-running or paced from the computer's keyboard.

For additional information, contact Enertronics Research, Inc., 150 North Meramec, Suite 207, St. Louis, MO 63105.

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GATO

Continued from page 35

crashed while playing Flight Simulator.

The manual is short, but packed with information. There is a template provided for your keyboard, which eliminates much jockeying around in the manual trying to learn which keys do what. Earlier versions of the program did not have the template, and I found I was flipping through the manual to find the controls, and studying the chart of the operations area. By making a large copy of the chart to stand near the monitor, you'll save yourself time and frustration. Don't expect to be able to master this game in an evening; it will take you anywhere from four to ten hours to begin to master it so you can concentrate on completing a mission rather than how to fire your torpedoes. (I offer this hint, which I learned the hard way: Open your torpedo tube doors before firing. By the time you figure out why the tin fish aren't working, you're in trouble!)

You receive your orders by radio, and your computer types in the message on the screen as it beeps the code. At levels 7, 8, and 9, you hear the code, but will not see the message displayed. In a classic example of understatement, the manual advises, "it helps to know morse code." Another example of the authors' humor is the statement advising you not to sink your sub tender, or you'll be "in big trouble with COMSUBPAC." I cannot say that I've ever been that dumb, but I felt more than a little sheepish when I'd completed three missions, returned to my tender and rammed it. I don't know if it sank or not; the view through my shattered periscope, accompanied by the klaxons screaming in my ears as the water rose around me was too embarrassing.

GATO will keep you at your controls for hours on end, and has plenty of surprises in store. But even when you lose a sub on a mission, and see your periscope crack and the control room fill up with water, your PC remains undamaged and ready to take you on another adventure. A high-resolution color monitor is almost a necessity to read the charts, and GATO is highly recommended for anyone with a sense of history who is a confirmed insomniac. Once you have begun to get the feel of operating a submarine, it is difficult to leave the adventure in the Pacific and return to more mundane chores.

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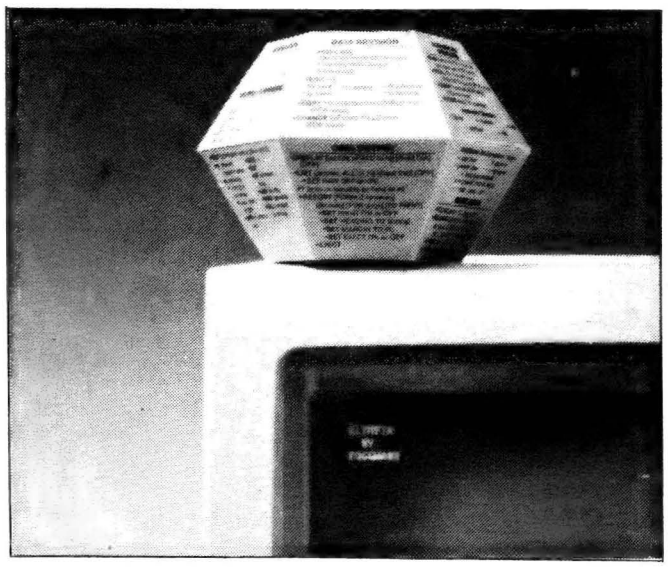
GLIMPIX™ Offers A Quick Reference Guide To Using dBASE II®



The **Using dBASEII** GIMPIX is a quick reference guide to dBASE II commands that stores flat, but pops-up into a 3-dimensional tetradecahedron (14-sided) shape to speed up the process of finding the desired information. It is the kind of obvious great idea thing that makes you say "Gosh, why didn't I think of it".

Designed to sit at eye level on a surface convenient to the computer, the GLIMPIX contains a listing of interactive **dBASE II** commands. These are displayed in a logical, easy-to-use arrangement according to command classifications (navigation, search, file and record management, numerical processing, etc...). In addition to making it easier to locate a specific command or check syntax, these groupings can often suggest alternative commands to improve the quality or speed of the computing activity.

The geometric shape of the GLIMPIX keeps the commands upright, a more natural and more comfortable reading position. The attractive appearance achieved by the unique shape, color combination and size encourages owners to leave them on display and, thus, easily accessible when needed.

Bold face headings and crisp, uncluttered, easy-to-read type for command statements and variable descriptions help users quickly locate and easily read the information they need.

The 3-dimensional shape also makes the GLIMPIX simpler and faster to use than a reference booklet or keyboard overlay and keeps it from getting lost in the clutter of papers that the typical user has on the desk during a computing session. It is especially effective when working with windows where a user might need several reference guides available at the same time.

The GLIMPIX was designed by FoggWare, Inc., 4913 Van Epps Road, Cleveland, Ohio 44131, and is available through computer retailers nationwide. Suggested retail price is $9.95.

Mention that you read about it in the Computer Shopper. ●

Executive Picture Show Now Available

PCsoftware announces their release of Executive Picture Show, a graphics presentations package for the IBM PC and compatibles; and a special exchange offer for PCcrayon users.

Executive Picture Show, which offers free-form drawing, business graphics, 8 different font styles (with the ability to create your own), 9 colors, the ability to create animated presentations, and customized slide shows with logic and viewer interaction has been priced at $245. But a special exchange has been offered to PCcrayon users.

Those users who mail in their PCcrayon (disks and documentation) with a check for $150, will be sent an Executive Picture Show in the next day's mail.

IBM has begun distributing Executive Picture Show and PCcrayon through its product centers and sales force, after an evaluation of the two products. It has also been reported that Burroughs Corporation has chosen the Executive Picture Show as its slide show and animated presentations graphics package for their new high resolution graphics work station, the ET2000.

Executive Picture Show currently runs on the IBM PC and IBM compatibles; and shortly on the Burroughs ET2000. System requirements for Executive Picture Show include 192K (256K on compatibles), 2 double sided disk drives or a hard disk and an IBM compatible graphics card. Inquiries should be directed to PCsoftware, located at 9120 Gramercy Drive, Suite 416, San Diego, CA 92123.

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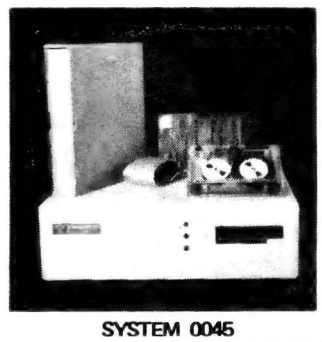

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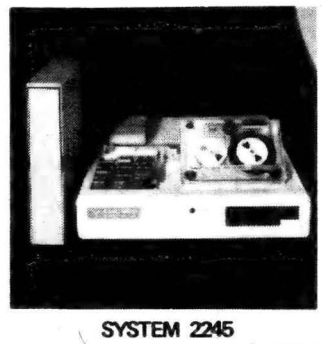

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Maynard Announces Innovative Hard Drive Backup System

Maynard Electronics has announced the introduction of the "MaynStream," a full-streaming hard drive backup system that far surpasses currently available systems which use image mode backup technology.

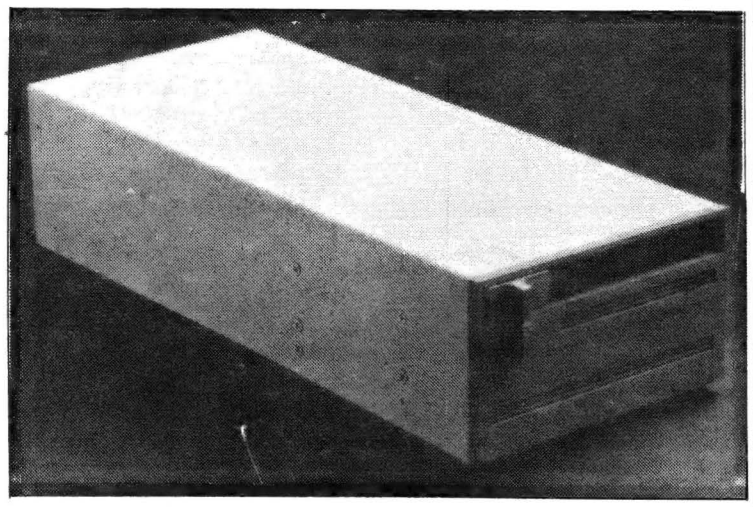
MaynStream is a high-grade, self-contained tape drive that backs up the IBM-PC, XT, AT, Portable PC, and all PC-DOS and MS-DOS* compatible hard drives. It is fully portable for multi-system applications and employs menus and prompts making it extremely easy to use.

MaynStream can back up a 10MB drive is as few as three minutes and offers users the option of backing up the entire disk or changed files only. The cartridge handles 26.7MB of data at a transfer rate of 90KB/second. MaynStream operates on 4 tracks with 2 channels and uses the standard intelligent interface QIC-OZ REV D. RLL-Encoded.

Readily configured to all PC-DOS and MS-DOS compatible systems including Maynard's 10MB Winchester, "APOLLO," 30MB, and "GEMINI" hard/floppy systems, the MaynStream is designed for low-noise, office applications and has a service life of 5 years or 30,000 hours.

Installation of the system is easy and MaynStream comes with an industry leading one-year warranty.

Maynard Elec., 430 E. Semoran Blvd., Casselberry, FL 32707. ●



Maynard Electronics' Innovative Full-Streaming Hard Drive Backup System, The "MaynStream"

Kraft Systems Introduces Executive Cursor Control

Now IBM PC users can make spreadsheet and word processing software more productive with Executive Cursor Control from Kraft. The Executive Cursor Control package consists of a preboot disk with a very sophisticated cursor control program and a Kraft Precision Joystick. The Executive Cursor Control software allows the familiar and easy to use Kraft joystick to operate as a cursor controller on many of the most popular spreadsheets and word processing programs for use with IBM PC and compatibles. The system literally turns a joystick into a highly productive business tool.

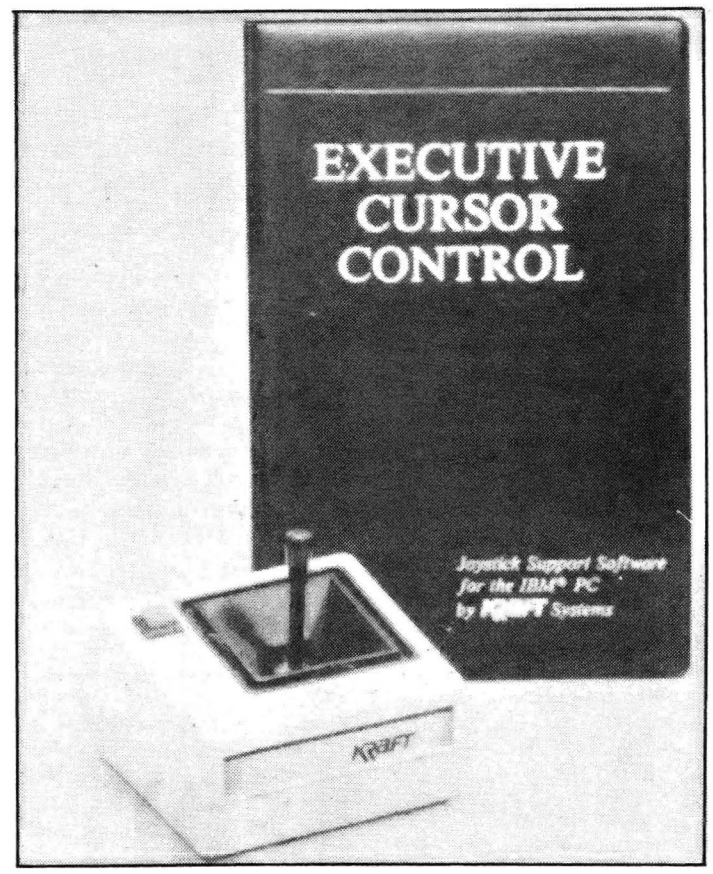
Executive Cursor Control is fast and accurate. It frees the numeric keypad for just that—numbers—as the joystick assumes the cursor control function. With Executive Cursor Control the user can sit back from the keyboard and use the joystick's programmable buttons to make menu selections, scroll up or down, or edit spreadsheet or word processing entries. The Executive Cursor Control software even provides for customized menu formats and macros to make business software more user friendly.

Another attractive feature of the Executive Cursor Control is its price. While cursor controllers and input devices can cost hundreds of dollars, the suggested retail price of the Executive Cursor Control package, complete with software and joystick, (P/N 820-026) is $69.95. The Executive Cursor Control software is also available separately (P/N 820-024) at $39.95.

Required hardware for the system is an IBM PC or compatible. 64K minimum, joystick control card, and DOS 2.0 or higher.

For more information, contact Kraft Systems Company, 450 W. California Avenue, P.O. Box 1268 Vista, CA 92083.

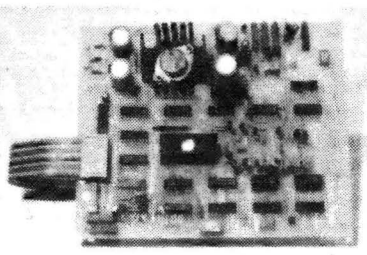
Mention that you read it in Computer Shopper. ●



Executive Cursor Control by Kraft Systems

CP/M EPROM PROGRAMMING SYSTEM

2708 2758 2716 2732 2764



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TRS-80

TRSDOS Topics

by Lon Andrews

Rapid Disk Duplication
(or "How to backup and still save time!!")

Backups for all their necessity are a process that seems painfully slow when the clock is pushing two and the bed is calling..."sleep, sleep, sleep". Rapidynamic Software advertises a Rapid Disk Duplication Program that sounds too good to be true. Having learned my lesson about the necessity of backups I decided to see if the program is worth using.

Supplied for use with TRSDOS 2.3, 1.3 or 6. disks, the program comes on a RAPIDOS disk for the DOS selected (1.3 or 6.0). Since 1.3 and 6.0 use different formats the same program won't work with both. RAPIDOS was developed to support games and other application software from Rapidynamic Software, Inc. The Rapid Disk Duplication Program (DUP) is an off shoot of RAPIDOS.

If you use TRSDOS you are familiar with the long wait for FORMAT and BACKUP. How about a 16 second format and a 45 second backup including formatting?? Sure is a difference. Backup alone takes about 26 seconds. Those times are courtesy of my stopwatch and not an advertisement. The backup times varied some but never went over 48 seconds with the average being 45.

The diskette format used by RAPIDOS to produce the speed necessary is slightly different from that used by TRSDOS but there is no problem with TRSDOS using this format. Drive speed is critical to the new format but as long as the speed does not exceed 302 rpm no problems occur. You need to use the fastest stepping rate that your drives will handle. Changing the stop rate is explained in the documentation very well.

Booting RAPIDOS and calling for DUP produces the Duplication Menu. At this point the program is memory resident and the disk can be removed from Drive "0". The menu is as follows:

Select option with arrow keys, then press <ENTER>.
Format
Backup
Format and Backup
Display Speed
Change Parameters
Exit to RAPIDOS

FORMAT prepares data diskettes
BACKUP copies the diskette without formatting.
FORMAT and BACKUP formats a data diskette and then copies the source diskette.
DISPLAY SPEED shows the rotational speed of a drive.
CHANGE PARAMETERS allows you to change the track count, password, name, or date of a disk.
EXIT TO RAPIDOS terminates the program.

If you desire to quit while an option is in progress, <BREAK> returns you to the main menu.

Once you have elected to FORMAT or BACKUP a disk the routine can be repeated by a single key prompt after it has finished. This makes the chore of making multiple copies or a number of formatted disks a simple task. No matter what option you select the menu and prompting makes completion of whatever job it is a simple task of following instructions that anyone can understand.

The documentation is complete and well written in an easy to follow format. Even without experience this is one program anyone can handle. The material on the various errors that can occur answer just about all the questions you can have about this program.

By the way, this program will back itself up. Rapidynamic relies on the users honesty rather than some elaborate device to stop unauthorized copies, or, like some, any copies.

Overall this is a well written program with very good documentation. It does the job it is designed for extremely well with little effort on the part of the operator. If you are using either TRSDOS 1.3 or 6.0 it will be a welcome addition to your library.

RAPID DISK DUPLICATION PROGRAM
For TRS80 Models I, III, or IV - 48K Disk Systems. $30.00 for one version. (Additional versions $15.00) Rapidynamic Software, Inc., 14358 Dyer Street, Sylmar, California 91342

MTERM - Model 4 Intelligent Terminal Package Review

According to Micro-Systems

Continued on page 42

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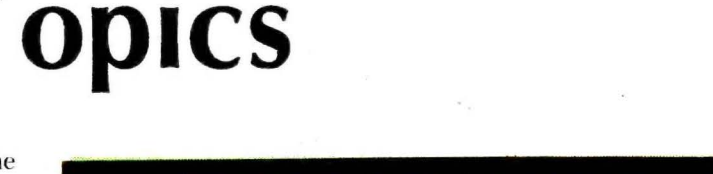

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Andrews
Continued from page 41

Software Inc. MTERM was written with two goals in mind:

First, to provide the user with all the features that they expect in an intelligent terminal program.

Second, to write the program such that it can be easily converted to any micro and DOS environment.

"MTERM includes all of the support utilities that you should ever need for your telecommunicating." This statement from the MTERM documentation gives a pretty good idea of the scope that was intended by Micro-Systems for this program.

MTERM includes features that are welcome additions to the micro user's toolbox. You can exit the terminal mode to the command menu and perform necessary operations and return to the terminal mode without missing a single character. Upon return to the terminal mode the screen is updated at a high rate of speed. MTERM will operate up to 1200 baud with no nulls required between characters and under some conditions will operate up to 2400 baud. DOS commands can be executed without exiting MTERM. Auto dial and auto transmission can be activated by command, without the presence of an operator.

Included with MTERM is the file transfer program XFER. This program allows you to transfer files directly between stations without converting them to hexadecimal format. XFER also provides the ability to convert binary files to ASCII hexadecimal files and vise versa.

MTERM is provided on TRSDOS 6.0 but the same version will run on DOSPLUS IV.

There are three files on the disk. MTERM/CMD (program), MTERM/DAT (default data file) and XFER/CMD (transfer and translate program). MTERM functions under both DOS on hard drive as well. We are using TRSDOS 6.2 and a 5 meg hard drive with no problems. The Model IV in use has 128K and MTERM allocates the upper 64K as a capture buffer. On a 64K computer the upper 35K is allocated.

Once you have a backup, get started by calling up MTERM and you will be in the terminal mode. To get to the command mode use <F1>. The command Menu presents the following options:

A: Set Macro Keys
B: Buffer Switch
C: Clear Buffer
D: Duplex Switch
E: Exit Microterm
F: Video Width
G: LF Suppression
H: CR Suppression
I: Auto-Dial Type
J: Printer Switch
K: Kill/Display Files
L: Load Buffer From File
M: Display/Print Buffer
N: Auto-Dial Telephone
O: Change/Examine Tables
P: Save Microterm File
Q: Load Microterm File
R: Set 232 Parameters
S: Save Buffer To File
T: Transmit Buffer Switch

Defaults for B,D,G,H,I,J, 232 parameters, video width and status of the buffer are displayed at the bottom of the menu. Once you have changed any of the parameters you have the option of saving them (option P) to a data file. These then become the defaults each time you call up MTERM. Should you happen to get to a place you don't understand <BREAK> returns you to the Menu.

There are so many features that it takes a small book to explain them all. The documentation is very well written and

Continued on page 43

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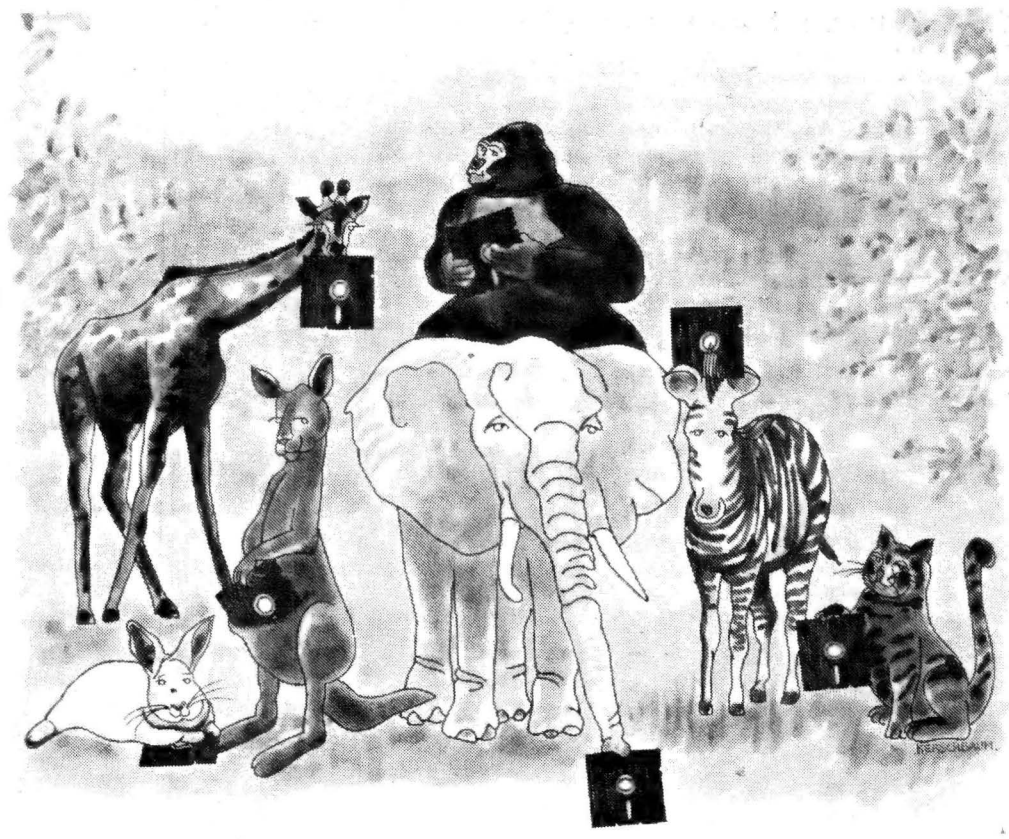

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Andrews
Continued from page 42

deserves close reading. So far I have not found a question that is not answered in the doc's. Well, maybe one. If you are using a Model IVP you have to use a command from the terminal mode to switch the internal modem to Auto Dial. The 4P's modems defaults to manual dial when you re-boot or power up. Start with <L*> to get the list of parameters for the 4P modem.

MACRO Keys (A on the menu) gives you 10 programmable keys that will take up to 63 keystrokes. Once programmed they are activated by <CLEAR #(0to9)>. This makes logging on a simple matter. <F1> switches from the terminal mode to the command mode and back. <F2> produces a true break signal. <CTL> <:> causes a screen print. Each of the MENU options are well explained in the documentation. Once you can handle the switch from terminal mode to command mode and back and you have set the parameters to match your modem, you are ready to use the program to communicate with another station. Try it local first to get use to the operation of MTERM before you start with long distance rates or paying time sharing rates.

Default rates can be set in different ways for various purposes. If you need different defaults for the various terminals you communicate with it is a simple matter to set the defaults for each and save them in different default files. When you call up MTERM the defaults from the file MTERM/DAT are used unless you specify a different file by entering MTERM followed by a space and the name of the data file. In this manner you can configure MTERM to as many different applications as you desire.

The Auto Dial allows you to store 10 numbers in memory. Once stored they are loaded with the defaults from the data file. Dialing the number is as simple as selecting the letter of the stored number from the menu and hitting <ENTER>. The program reverts to the terminal and waits for the connection to be made. If the line is busy or does not answer MTERM disconnects in 30 seconds.

This is a fine program with excellent documentation. All aspects of the package are well documented in the 100 page notebook that accompanies MTERM. There is even a 14 page glossary of terms to assist those unfamiliar with the terminology of telecommunications. You can get as technical as you desire with this program. There is an 18 page section of the manual that covers the technical information that an experienced program will want to have on hand. It also works well for the average operator that wants nothing more than to talk to local Bulletin Boards.

MTERM for the Model IV add $79.95
Micro-Systems Software, Inc. 4301-18 Oak Circle, Boca Raton, FL 33431, (305) 391-5077

Digital Disk Diagnostic Program for Model III IV

I had read ad after ad about this program and waited with great expectation for the opportunity to get a review copy to see if it lived up to expectations. When it finally arrived I was impressed with the documentation right off the bat. Well written and very nicely printed, it makes good reading. It is written so well that it teaches about disk drive operation as well as how to operate the program.

The materials supplied by J&M Systems include a Users Manual, The Disk Drive Analysis Program (DDA) and The Digital Diagnostic Disk (DDD). Read the manual from cover to cover. It is well worth the time spent. Boot the program (DDA) disk, the program loads and runs. Since it is memory resident you may remove the program disk. Both (or all) of your drives are available for testing. The main menu shows:

1 - Clamping Test
2 - Quick Tests
3 - Speed Test
4 - Index Hole Timing
5 - Read Sensitivity
6 - Head Alignment
7 - Directional Seek Test
8 - Head Rotation Test
A - Analog Alignment Aid
P - Parameter Changes

Each one of the above selections will produce another menu screen for the individual test. Most commands are the same from test to test although

Continued on page 44

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Communicating With The Real World

by L. Van Delray

There is a man-machine incompatibility problem that all computer users bump into at some time, even though this incompatibility is usually not readily apparent to the user.

Such incompatibility occurs because we humans live in the "real world" where everything is operated by electrical devices energized by smoothly changing values of voltage or current (we call this "analog"), while our digital computers live in a world of their own—a world where only two states exist—true or not true, high or low, or if you wish—flip or flop. And where everything happens incredibly fast.

The problem starts when we want our digital computer to either *accept* data from the slowly varying analog world, or we want the digital computer to *send* signals to the analog world.

Conditions really get bad when we attempt to get these two different worlds, each "speaking" a different language, to communicate with each other. We call this process Analog-to-Digital (A/D) and Digital-to-Analog (D/A) conversions. It is used to operate things like robots or music and speech boards.

Before we can discuss A/D or D/A, we must first learn how to establish communications between these dissimilar worlds. This means that we must learn how to convert the analog language into the digital language, and this is the purpose of this column.

To perform a D/A or A/D language conversion, let us first look at the fundamental language unit of a digital computer—the digital byte—the 8 bits of data that make up the contents of the data lines in a conventional 8-bit digital computer (since 8-bit systems are the easiest to understand, we will discuss this type).

In the digital world, although all bits are either 1s or 0s and all look alike, they are not created equal because some bits have a higher value than others. Let us see why.

Continued on page 47

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Andrews
Continued from page 43

not all tests have all the commands. <D> selects the drive to be used. <H> selects the head (Double sided drives). (I) selects inner test track (nearest to the spindle). <M> selects the middle test track. <O> selects the outer test track. <S> starts or stops the test and <@> returns to the main menu.

Each Test screen contains a status line that indicates the drive being tested, current head selection, and track selection. There are also two error screens that handle errors caused by the drive not being ready and the diagnostic disk not being present when needed. Each test is well documented and the procedures explained so that there is no real problem in running the various tests.

At this point I tried the Quick Test and my computer failed. As a matter of fact it failed the Radial Alignment, Azimuth rotation and Hysteresis Tests. Time to panic. My computer is sick!!! Since it was late at night and I wanted to finish I borrowed my son's computer and it failed the same tests. To make a long store short, better than 20 Model III/IV's flunked. Some brand new out of the box at the local R/S Center.

During this process I had the three TRS 80's at home torn down and tested by a technician who works at the Kennedy Space Center. One of the three has one drive slightly out of alignment. All three were checked with an ocilloscope. All three failed the tests again! At this point I went to my editor with the problem and asked him to contact J & M to see if possibly we had a bad disk. More than once disks have suffered in the mail and have been returned for replacement. Wrong move! The communications that took place were far from satisfactory.

I ended up calling to see if I could get some more information and after some time and several different people ended up with "Send the disk back and we will check it." I felt then, and still feel, that they thought that we were trying to badmouth their program. As of this date no disk has shown up in the mail nor have we heard from J & M Systems. If the program functions as well as the documentation is written it will be GREAT! However, we have no way of knowing yet. If the disk shows up we will let you know how it works.

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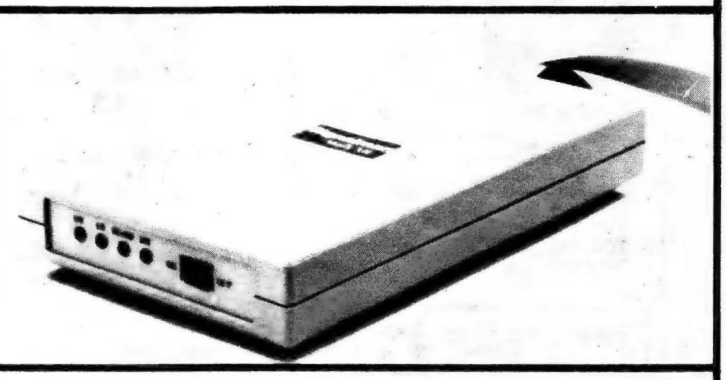

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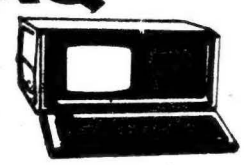

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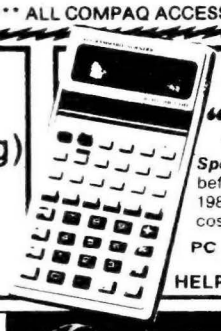

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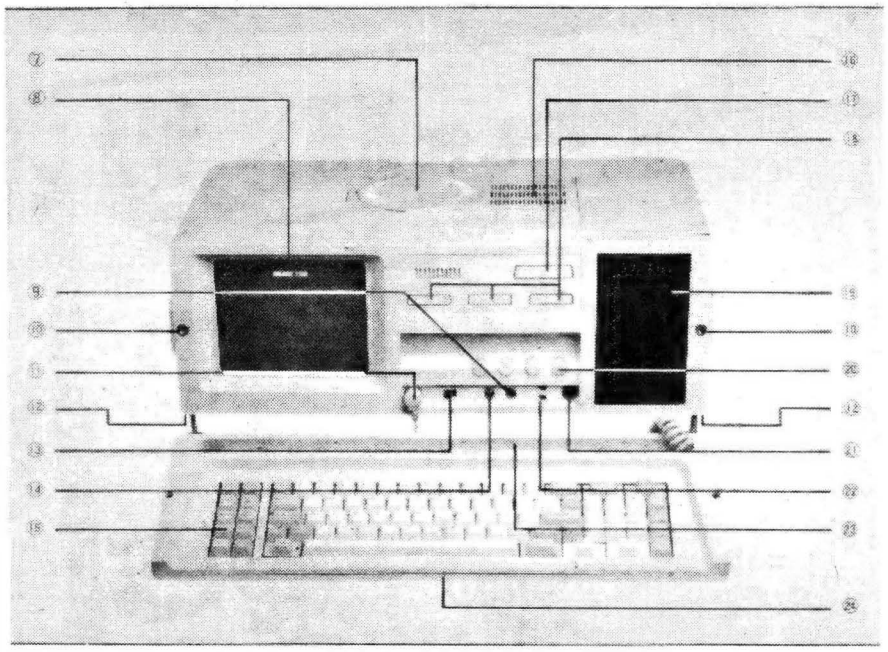

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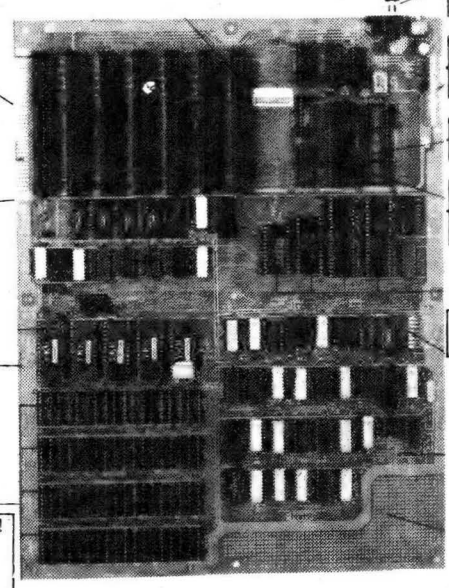

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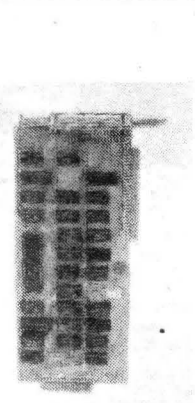

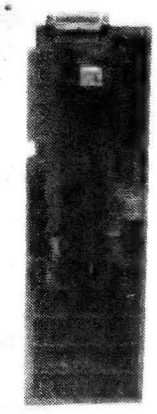

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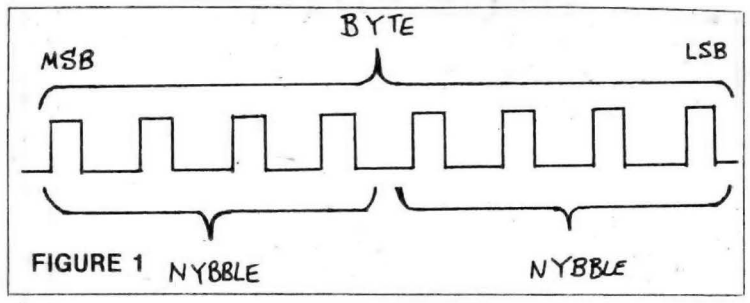

FIGURE 1

Look at Figure 1. Here are 8-bits, all appearing identical, and all in a row. Unfortunately, in this "logical" world, no matter how many bits we have, only two of them have names.

The bit on the extreme left is called MSB—Most Significant Bit—while the bit on the extreme right is called LSB—Least Significant Bit. In this digital universe, only the bits at the extreme ends have names, the bits in the middle will be forever nameless!

How much more significant is MSB than LSB——it depends on the number of bits between them.

Consider our money valuations. The LSB is units (cents), the next bit to the left is 10 cents, the bit next to it is 100 cents (which we call a dollar), while the MSB (in this example) is 10s of dollars. Note that our money is decimal (each bit is 10 times larger than the bit on its right).

Thus starting with the LSB, $12.45 means 5 of the LSB for 5 cents, plus 4 of the 10 cents making 40 cents, plus 2 of the single dollars, plus one of the tens of dollars. If you add everything up, it comes to $12.45.

The binary code used in digital logic is unlike the decimal code used in money. Regardless of the number of bits, starting at the LSB, each bit has twice the value of the one at its right. That is, the LSB is 1, the next bit to the left is 2, the third is 4, the fourth is 8, the fifth is 16, etc., to the 8th bit (MSB) which has value of 128. The total of all the bits thus adds up to 255. Thus, in a 4-bit system, the total of all the bits adds up to 15, while in an 8-bit system, they total 255.

In a 4-bit system (8-4-2-1), the MSB is worth 8 of the LSB, while in an 8-bit system (128-64-32-16-8-4-2-1), the MSB is worth 128 of the LSBs! I leave it to the reade to figure out the value differences in 16- and 32-bit systems!

There is no need for the human operator to try remember all the unwieldy binary digits because it can lead to headaches. The computer doesn't have this problem because it is built to use binary numbers.

What we use to help our poor memories is something called "hexadecimal"—a word that means a number system having a base of 16, and abbreviated "hex." You may well ask, why base 16?? How did we arrive at this strange number? Human counting started with the fingers, and I don't know of anyone with 16 fingers because I certainly would have remembered him (or her). No, hex is a creation of logic people in need of a simple way to keep track of large binary numbers.

Hex makes sense if you look at a group of binary bits that may make up a program, and wonder how you could remember the lengthy arrangement of 1s and 0s. To make matters even worse, if you make a mistake in just one digit, the program "bombs" and comes to a grinding stop. Don't ask what a program "bomb" looks like, you will know when it happens—you cannot miss it.

The chances are that you can't remember all those digits in the correct order. But, sly people that we digital types are, we found an easy way.

Before we go on, keep in mind that all alphanumerics (letters of the alphabet and all numbers) used by the computer are formed from two 4-bit nybbles that make up one 8-bit byte (this is also shown in Figure 1). And, remember that if you start at the LSB and proceed to the left, the decimal values go 8-4-2-1.

Now, if we count from 0 to 15 using only digits we come up with the obvious 1, 2, 3, 4, 5, 6, 7, 8, 9, but we have a problem with 10, 11, 12, 13, 14, and 15. Why? Because the numbers between 10 and 15 consist of combinations of two already used single digits—and, we cannot use these digits again.

How do we overcome this? Simple, we will not use digits for the numbers 10 and above, we will use letters of the alphabet. To make life easy, we will use A for 10, B for 11, C for 12, D for 13, E for 14, and F for 15. Now we can count to 15 thus:

1.2.3.4.5.6.7.8.9.A.B.C.D.E.F

So, if we had some data like 11011011, instead of remembering eight digits, all we have to do is break the 8 bits into 4-bit hunks and note that the left-hand nybble 1101 is 8 + 4 + 1 = 13 = D, and 1011 the right-hand nybble is 8 + 2 + 1 = 11 = B. Thus, instead of remembering 11011011, all you have to do is to add the values in each binary position indicated by a 1 and convert them into hex. Thus, these two nybbles add up to DB. Since DB is easier to remember than 11011011, you can see the true value of hex with regard to human sanity.

However, things were not always that easy.

Back in the early days of microcomputing, the "octal" (base-8) numbering system was used. In this approach, the 8-bit byte was broken into clusters of three bits starting with the LSB. This produced decimal values of 1-2 at the MSB end, followed by 1-2-4 and 1-2-4. Thus, using binary, the highest (all logic 1s) number would be 11 111 111 or 377.

We mention octal because if you look at the instruction sets of some CPUs, you will note that all instructions in each category (input, output, rotate, etc.) are arranged in octal order. There is nothing significant in this approach, it's just that many years ago, the original design engineers elected to go the octal route. At this stage in computing, octal

Continued on page 50

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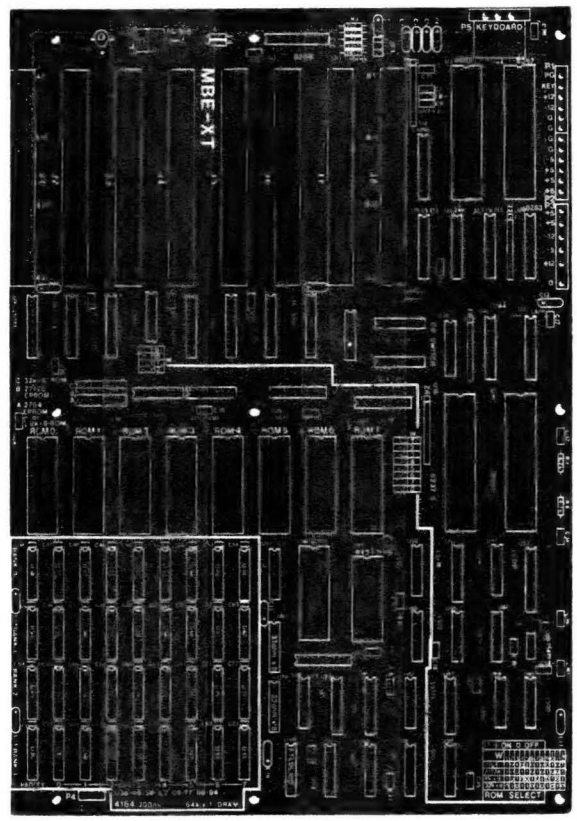

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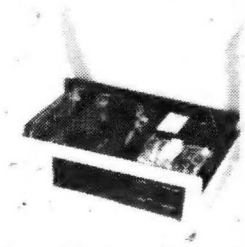

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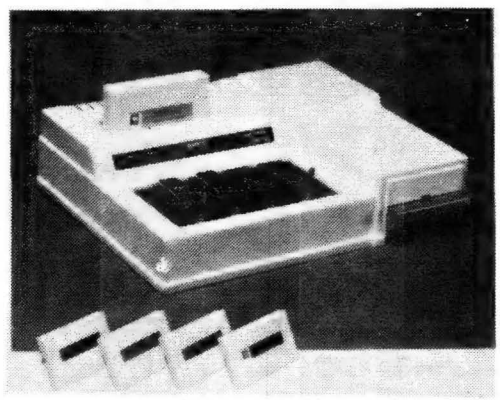

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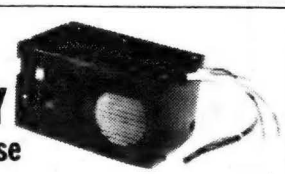

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Continued from page 47

is mainly of historical value.

As we now know, in the binary code used in digital logic, regardless of the number of bits, starting at the LSB, each bit has twice the value of the one at its right. That is, the LSB is 1, the next bit to the left is 2, the third is 4, the fourthe is 8, the fifth is 16, etc., to the 8th bit (MSB) which has value of 128. The total of all the bits thus adds up to 255. In a 4-bit system, the total of all the bits adds up to 15.

Now, let us assume that we wanted to use 4-bits (a nybble) to represent a 10-volt signal.

This means that since the four bits have the values of 8-4-2-1 for a total of 15, each increment is worth (10 volts/15) or .66-volt for each of the 15 increments.

In an 8-bit system, the range between 0 and 10 volts is divided into 255 discrete digital steps making the resolution of each step (10 volts/255), or .03921569-volt. Thus you can see that the more bits used in A/D or D/A conversion, or in a music or speech system, the "smoother" the signal becomes.

Now, for an example, let us see how 4-bits of digital data can produce an output voltage dependent on just which bits contain a logic-1. (The same theory applies to 8-, 16-, or 32-bits, except that 4-bits makes for simpler numbering.) Also, the hardware example we will use does not really exist, it is purely for explanation purposes.

As shown in Figure 2, assume that there are four switches each connected between a voltage source of the same binary value as the switch identification (i.e., with each step equal to .66 volt, S8 is 5.28 volts, S4 is 2.64 volts, S2 is 1.32 volts and S1 is .66 volt). Also assume that a logic-1 at that binary position closes the switch, and, in this theoretical circuit, all the output voltages are additive.

Thus, when S8 (5.28 volts) is closed at the same time that S1 (.66 volt) is closed, the output will be (5.28 + .66) or 5.94 volts, or when S4 and S2 are closed simultaneously, the output will be 3.96 volts.

Therefore, if the switches were high-speed, all we need do is rapidly switch them open and closed so that at any given instant of time, we could have any desired output voltage level between 0 volt (all switches open) and 10 volts—actually 9.90 volts—when all the switches are closed.

There are several ways to make the conversion the other way—from analog-to-digital (A/D)—but we will discuss only one.

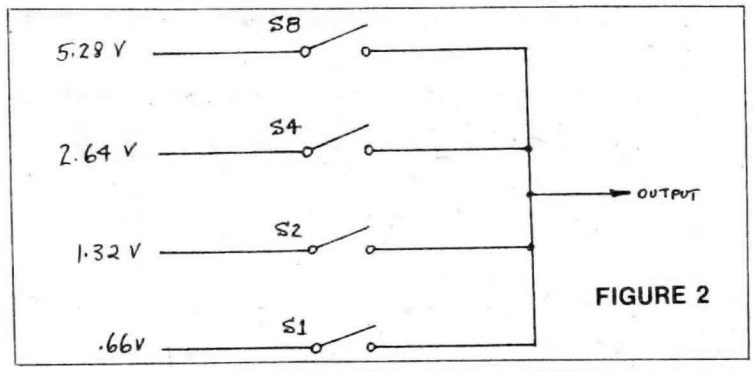

FIGURE 2

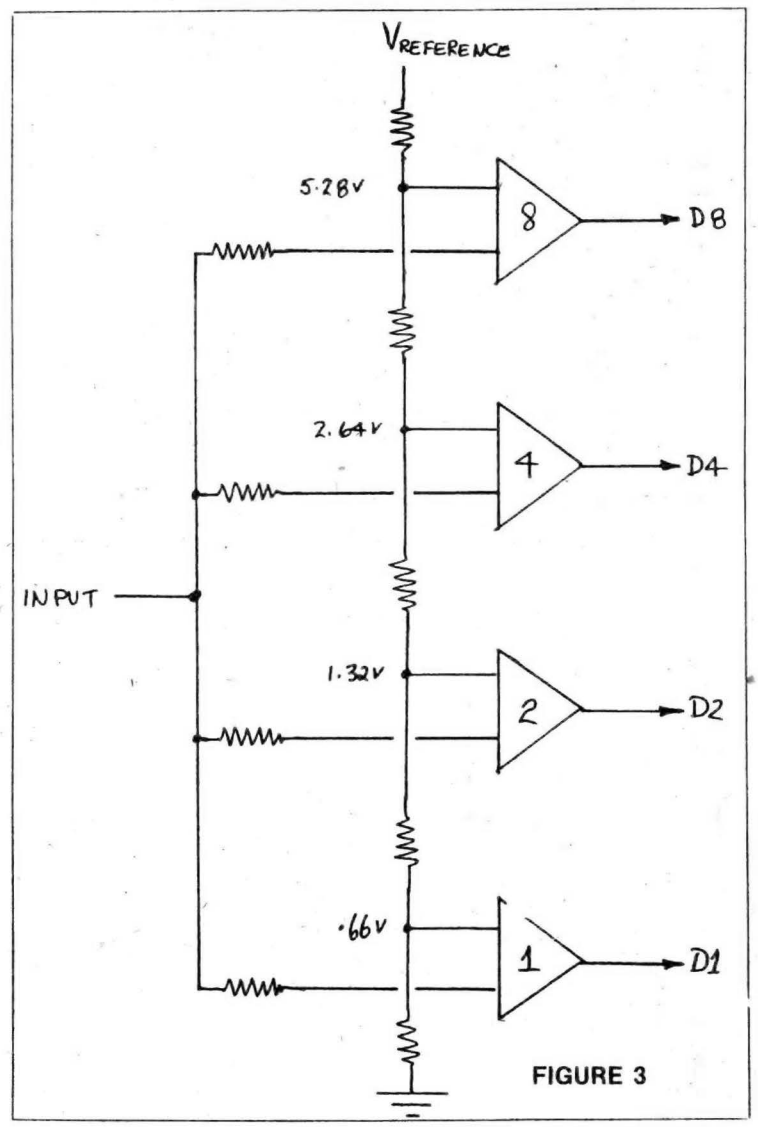

FIGURE 3

As shown in Figure 3, let us assume a circuit having 4 "comparators" that compare an input voltage against a known reference voltage. In a comparator (which is similar to an op amp), when the input level very slightly exceeds the known reference applied to each comparator, the output of the comparator changes states from a 0 to a 1.

Thus as the input voltage to be digitized rises from zero and very slightly exceeds .66 volt, comparator #1 is switched on. This produces an output of 0001. As the input voltage continues to increase, each comparator in turn switches on until all four are turned on indicating 1111 to the four output lines.

If you have managed to hang on this long, at this point you should have an idea of the basic concepts behind A/D and D/A conversion.

We will enlarge on these when we cover the basic hardware of A/D and D/A conversion, and music and speech systems. ●

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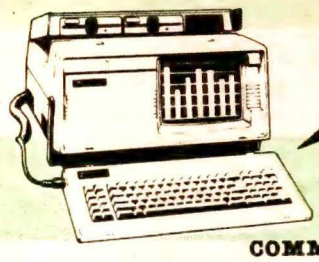

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Tandy Corporation/Radio Shack Offers New Program For Personal Computer Needs At Colleges

Tandy On Campus, an innovative program sponsored by Tandy Corporation/Radio Shack's Education Division, is helping more people become computer literate on college campuses around the nation.

The two-day free computing seminar gives administrators, staff, faculty and students an opportunity to learn the most current information on advances in personal computing technology. The programs are unique to the college scene because company representatives and administrators preplan the seminars to fit each university's special needs.

The seminar includes in-depth presentations on the latest in personal computers, as well as hands-on demonstrations of computer hardware and software. The program explores new computer applications to enhance the campus population's productivity in the offices or classrooms.

"We've had a very good reponse to the Tandy On Campus program," said vice president of Radio Shack Education Division. "There seems to be an intense interest in personal computers on the campuses this year."

Before arranging a Tandy On Campus program at a university, the company's Regional Educational Coordinators meet with school administrators to decide on what kinds of presentations and displays would interest the campus community. This fresh approach allows university adminstrators to determine - before the Tandy On Campus program is presented - what they want to see in a computing seminar rather than what the sponsor wants to present. This novel planning permits college officials to choose topics that address their needs along with convenient time and day schedules to attract the best campus participation.

After the university's requirements are identified, the tailored Tandy On Campus program can be conducted within six to eight weeks following initial contact. The computing seminar schedule can include up to ten 50-minute presentations and participants can attend one or all of the sessions at no cost.

Continued on page 55

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DOSPLUS IV/A Alternative To TRSDOS 6.x

Micro-Systems Software now offers TRS-80 Model 4 users a faster, more powerful alternative disk operating system that includes a built-in macro assembler, editor and linker. DOSPLUS IV/A is available for $169.95 (all prices suggested US resale) at participating Micro-Systems Software dealers or (for a limited time) direct: dealer inquiries are invited. Registered DOSPLUS IV owners can upgrade for $25.

DOSPLUS IV/A includes an enhanced BASIC interpreter and M-ZAL, a disk editor-macro-assembler (available separately for $149). Its own arsenal of features and utilities takes full advantage of the enhanced memory and features (80x24 display, audio, inverse video and more) of the Model 4. And its unique **MEDIC** (Menu Environment DOS Interface Controller) system utility offers single-keystroke access to frequently used file operations. Other DOSPLUS IV/A utilities include diskzap, diskdump, dircheck and filedisk.

DOSPLUS IV/A BASIC is enhanced with the following: sort, cross referencing, global search and replace, labeling, controlled screen inputing, detailed error messages (and an audible "error beep"), shorthand and more. Its enhancements also help BASIC load much faster. Two new BASIC commands are included to help earlier TRS-80 owners move up to the new system: **option S** ("short form") is compatible with Model III BASIC, **option L** is the Model 4 configuration.

Diskzap allows viewing and editing binary program or data files, and is now enhanced to operate on any DOSPLUS-formatted media (floppy or figid).

DOSPLUS IV/A's **diskdump** file editing program has also been enhanced to include a program address locating facility, byte location ability and an ASCII convert routine.

Dircheck completely verifies the disk directory, and has an option to fix all correctable errors; it can even check directories of systems structured similarly to DOSPLUS.

The **filedisk** utility supports "files within a file" directory space usage, especially efficient when storing many small, unchanging programs (like utilities) that could otherwise consume available directory space before using up all the actual disk space.

Memdisk (a DOSPLUS IV/A driver) assigns a portion of memory for use as a virtual disk drive. Programs and data can be stored and retrieved as if on a physical drive, but it operates much more quickly.

A **system** command lets DOSPLUS users configure the system and its many options to their preferences. **Sysgen** installs the system on any supported media (rigid or floppy, single or double sided, single or double density); it can even install all of DOS in a (RAM) memdisk.

Other features of DOSPLUS IV/A include support of multiple commands on the same line with implied carriage returns, an external device structure for total device independence, user accessible (and documented) direct disk I/O routines, a complete job control language and much more.

For additional information, contact Micro-Systems Software, Inc., 4301-18 Oak Circle, Boca Raton, FL 33431.

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Tandy Corporation
Continued from page 54

For the formal presentations, Radio Shack staff set up a network of 16 TRS-80® Model 4 and Model 100 personal computers. After an overview of the microcomputer system, participants get hands-on experience using these computers in various ways with different software packages.

An "Introduction to Computers" session is presented during each seminar so non-computer users can feel more comfortable and at ease working with the equipment. Other tailor-made presentations might include "Business Simulations", "Authoring System", "The Model 100", "Word Processing" and "Spreadsheet Analysis." To date, the word processing presentation has generated the highest interest on the campuses.

In addition to the formal sessions, a display area is open both days so individuals can see and try different types of microcomputer systems and software. Tandy's expert representatives are available to answer questions and demonstrate state-of-the-art computer uses to solve daily tasks in a more efficient and productive way.

During this program, Tandy representatives are available for conferences with individuals or small groups to demonstrate software and hardware in addressing specific applications to departments and specialized schools.

For the name and phone number of your local Regional Educational Coordinator, call Tandy Corporation/Radio Shack's Education Division at 800-433-5682, toll-free. In Texas, call 800-772-8538.

For more information regarding the Tandy On Campus program, contact your local Regional Educational Coordinator or call Tandy Corporation/Radio Shack's Education Division at (817)390-3832.

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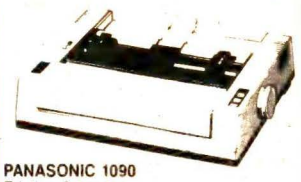

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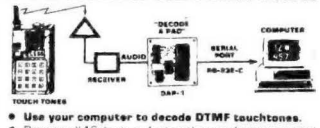

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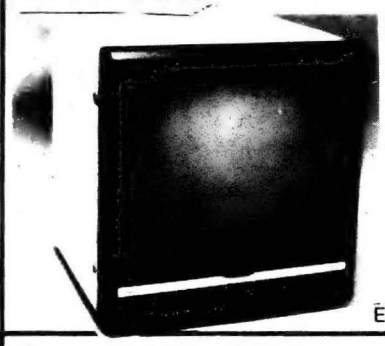

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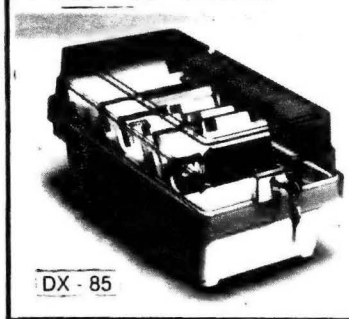

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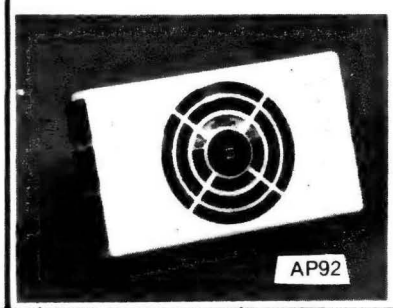

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COMDEX/Fall '84 — Largest Computer Show Ever

by Stan Veit

COMDEX was started because personal computers were given a back seat at the National Computer Conference. However, the growth of this show has even exceeded the growth of the industry it serves. The 1984 Fall edition filled the Las Vegas Convention Center, one of the world's largest, and the convention facilities of four hotels. It was claimed that 100,000 people attended the five-day show and **over 1,400 exhibitors showed** their products. The seminars, lectures and addresses by industry leaders were well attended by computer dealers, software developers and value-added resellers. In fact, the Interface Group, producers of COMDEX, plans to extend the show period to 7 days in 1985 to allow attendees a chance to visit all the exhibits during the show.

There were no startling new advances announced during this show, and very few new computers were introduced. Texas Instruments introduced the 16-bit Pro Lite, portable MSDOS computer system which Computer Shopper examines at greater length elsewhere in this issue. Kaypro showed their new 16-bit transportable with dual capabilities for MSDOS and CP/M. This unit with 10 Mbytes of hard disk storage, one 360 Kbyte floppy disk and the full Kaypro business package of software will retail for only $3200. George Morrow of Morrow Computers was one of the show hits with his little red book " Quotations From Chairman Morrow." Everyone walked around waving the red book. One of the often repeated quotations was "If George Lucus designed a lunch pail for Darth Vader, it would look like a Kaypro." Even David Kay got a laugh out of that one.

Epson introduced the QX-16, shown on the cover, and wonder-of-wonders it runs Valdocs 2 the improved version of the original integrated software system. Raising Star, the originators of Valdocs, also had a booth at this show, and they displayed graphics programs for the QX-10 and QX-16 computers that were as easy to use as Valdocs itself.

Perhaps the largest group of new machines were printers. Faster, better, cheaper, in monochrome and color, the new printers included improved dot matrix machines that could print at speeds up to 700 characters per second and still produce letter quality output at 120 CPS. The ink jet models also could print faster this year and it was easier to change fonts and point sizes. Laser printers and electrostatic printers were shown by many vendors at prices from $2,500 to $10,000. These wonders not only could print "letter quality," they could also print "hot type quality." That means they can do work that looks like it was printed, an amazing advance over last year's models.

The modem companies were pushing 2400 baud modems to boost a sagging market. They have sold 1200 baud models for two years now and need a new product to spur sales. The fact that there are very few services that will work with 2400 baud equipment is not considered much of a drawback. The new models are equipped with fall-back circuits. If there is a problem on the telephone line with 2400 baud transmission, the modem will down-shift automatically to 1200 baud. Hayes and other vendors are offering 2400 versions of their communications software with the new modems.

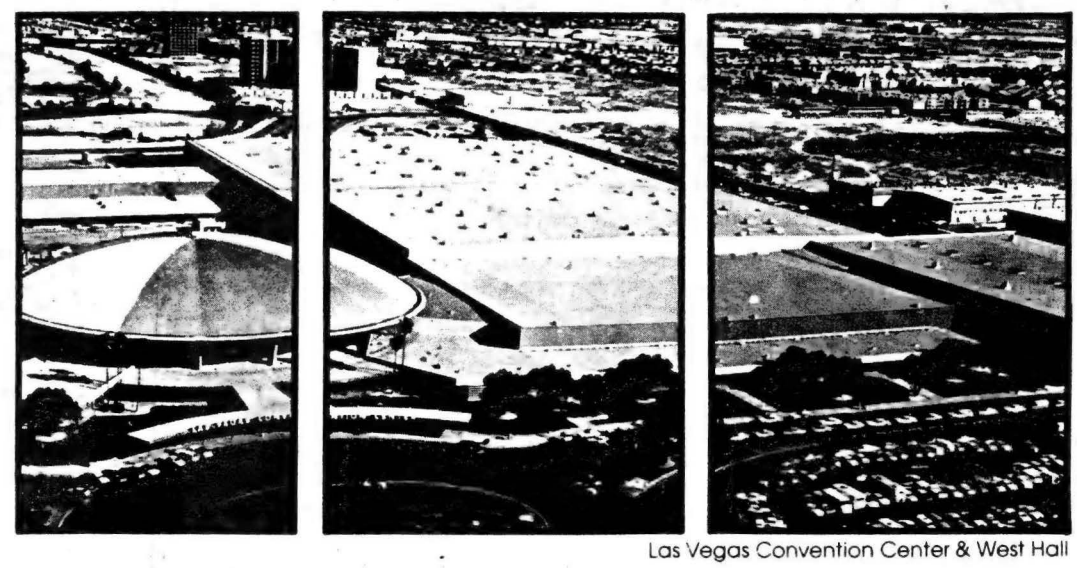
The oriental manufacturers showed every type of disk system from 8" to 2" and they are making both floppy drives and hard disks. From the OEM prices quoted, they will soon flood the market with drives of every description. The two-incher was a little drive intended for use with an MSX computer. It was not in accordance with the MSX spec but since there is yet no MSX DOS it will do until the real thing comes along. TEAC was the vendor of this little beauty.

Although no MSX computers were officially introduced at this show, I had a chance to play with one and firmly believe that they will replace all other low-cost game type computers.

Software systems were shown by the hundreds ranging from simple games with graphics to full business systems. The graphic techniques and window displays were everywhere. Integrated systems combining spreadsheets, word processors, communications programs and data bases were shown for use with every type of computer. The accounting systems were expanded to include integrated display and graphic capabilities. UNIX applications were much in evidence and the fight with MSDOS is beginning in earnest. The show is no place to really check out any piece of software. You are merely looking at special demo versions and you have no chance to play with the software. We did arrange for review copies of much promising software to analyze during the next few months.

An interesting sidelight to the show was the entrance of yet another communications

Continued on page 62



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Ultra Controller
Continued from page 55

trollers which allows us to offer a Drive O system of the highest quality and lowest price yet.

The Ultra Controller boasts many of the features that are expected on finer disk controllers and also has some features never before available to the color computer owner. The Ultra features a simpler more efficient design that results in lower power usage and less parts subject to failure. In addition, The Ultra Controller is easy on your diskettes with selectable motor off timing.

The Ultra Controller, for OS-9 owners and diskophiles, is the controller of choice. DSS Peripherals designed The Ultra to handle 8" drives as well as the standard 5¼" drives. Now, adding a CP/M board and 8" drives makes the color computer a respectable CP/M system. It is also fully compatible with hard disk systems as well as the new 3" drives.

Since The Ultra uses a 5+ volt power supply, it is fully compatible with all current multi-pack interfaces, including Radio Shack grey and white models.

In addition, DSS makes The Ultra available without an operating system (OS) chip for those hackers and programmers who would rather burn their own EPROM OS using The Intronics EPROM Programmer also available from DSS. If you wish, you may also select RSDOS or JDOS in The Ultra when you place your order.

Other exciting new features include an LED write indicator to verify writes to disk, single +5 volt power supply for CoCo II compatibility and a professional off-white finish that matches your computer. The Ultra Controller is compatible with all versions of the color computer, I and II.

In addition, The Ultra Controller features on-chip phase lock loop data separation eliminating the need for repeated adjustments. Also, on-chip write precompensation logic provides more reliable reads. To eliminate system hang-ups and glitches, DSS makes available an input buffer for $5.00 additional on The Ultra, making it the most reliable disk controller on the market.

The Ultra also sports many features expected to be found on higher priced controllers such as gold-plated contacts, metallic enclosure, track to track access, multiple sector read/write, single and double density formats, and soft sector formatting.

Althouth The Ultra Controller is priced lower than other controllers, it is built of the finest materials under stringent controls to insure the highest quality controller possible. DSS Peripherals backs The Ultra with a full year warranty as well as the usual high quality technical support DSS has become associated with over the past three years of outstanding service to the color computer market.

To purchase The Ultra or receive more information, contact DSS Peripherals Corporation, 62 Commerce Drive, Farmingdale, NY 11735 or call (516) 249-3388. DSS offers The Ultra Controller for $110 fully assembled and tested and features The Ultra in their Drive O system selling for $275 complete. DSS Peripherals also carriers a complete line of hardware and software for the color computer community. Dealer inquiries are encouraged.

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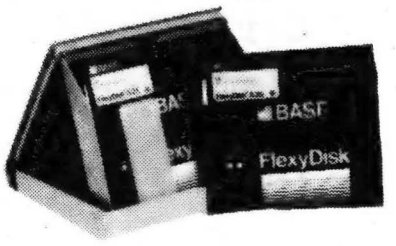

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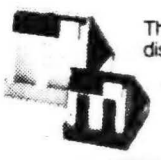

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RH Electronics, Super Fan II		$ 75	$ 59
*Titan/Saturn, Accelerator IIe		$ 599	$ 399
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TG Products, Tracball		$ 40	$ 26
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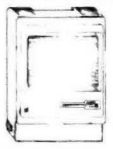

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*Insoft, 3 Games, Zarg/Spider Raid/Grapple		$ 82	$ 25
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Penguin, Transylvania		$ 35	$ 24
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* 12" Amber, #300A		$ 199	$ 149
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ZENITH, 12" Amber, ZVM122	NEW	$ 159	$ 95
12" Green, ZVM123		$ 200	$ 89
12" Amber, ZVM124		$ 200	$ 139
12" Color, ZVM135		$ 599	$ 469

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RX100, 100 cps, 136 col., pin&fr.		$ 499	InStock
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*JUKI, 6100, 18cps, Para, 3 pitch		$ 599	$ 449

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Microbuff In-Line 64K, Ser.		$ 349	$ 259
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Microfazer, w/Copy, PP, 8K, #MP8 w/PS		$ 179	$ 139
Microfazer, w/Copy, PP, 64K, #MP64 w/PS		$ 299	$ 229
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Veit continued from page 58

giant into the personal computer industry. We have AT&T. IT&T and now Ericsson. The Swedish communications company has introduced a complete line of computers and peripherals through its American branch. Ericsson Information Systems of Greenwich. CT which is a joint venture between Ericsson and Atlantic-Richfield. They have introduced an "Ergo-Intelligent" computer and a full line of printers. terminals and video monitors. The so-called Ergo-Intelligent computer is another MSDOS machine that is designed for ease of use. Ergomatics is a big thing in Europe. but Ericsson will need more than that to crack the U.S. market with another PC clone.

A most important part of the COMDEX show happens after dark in the hospitality suites set up by exhibitors. It is there that the deals and sales are made that determine how well each vendor does during the next year. This year. it was reported that while there was as much merriment as in the past. less business was transacted. The motto of the show seemed to be the slogan on buttons given out by one exhibitor that said "DON'T PANIC" and everyone seemed to wear one of these buttons.

John Scully of Apple warned the industry in his keynote address that they must break out of the mold of MSDOS clones and become bolder and more innovative. He warned that the Japanese would take over another industry if they were allowed to compete with a static American product line. He said that American manufacters must keep up the introduction of new and advanced developments to keep leading the world in computers. He also said we must be as innovative in manufacturing techniques as we are in developing new computers. Mr. Scully boasted that the new Apple plants were so automated that labor was only 1% of the cost of the computer. This, he said, was the only way to compete in the world market.

With the ending of COMDEX/FALL '84. I returned home to spend time analyzing what I had seen at the show. During the next few months we will present many new products to you as a result of testing new software and hardware releases. ●

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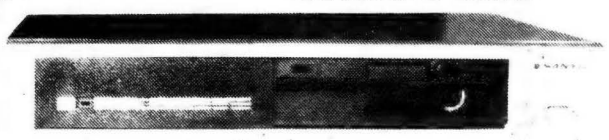

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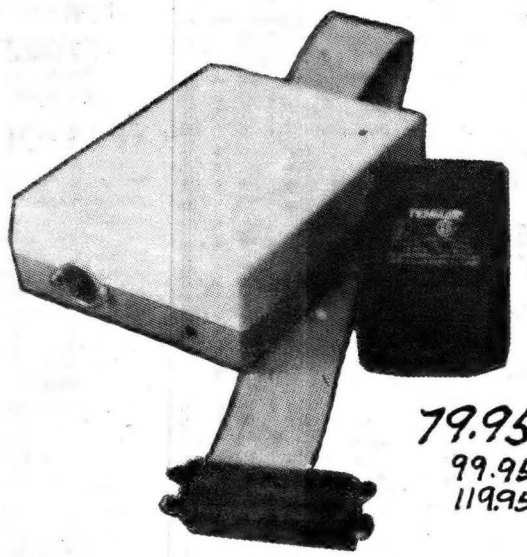

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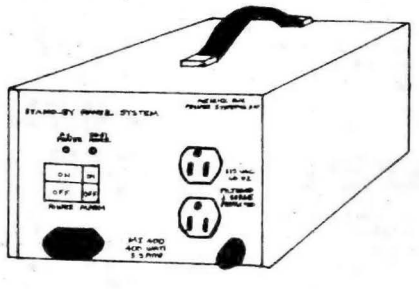

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APPLE

Seeing Quadruple — Or — How To Put Up to 160 Characters On Your Apple's Screen

by Philip Chien

Videx has done it again! The company who came out with the 80-column Videoterm card has topped itself with its new ULTRATERM. I'm lucky enough to Beta-test one of the early cards. Unfortunately, my card came to me DOA (Dead-On-Arrival), but it was quickly replaced by Videx. Based on Videx's long record with the Videoterm cards, I expect that normal production cards will have a high reliability rate, and my DOA card was undoubtedly an exception to the rule.

The card is well made and tightly packed. It's a multilayer design (an advanced design normally only seen in high quality military equipment). The multilayer design enables the card to be small enough to fit in either an Apple // or Apple ///. The Ultraterm comes with a video cable, a well-written reference manual including wallet size quick reference card, and a demonstration disk.

It's quite simple to install the card. Remove the computer cover, put the card in the slot, push the cables out the back, attach one end to the Apple's normal video output and attach the other end to the monitor. The manual makes it very easy—even if the user has never opened an Apple before.

The 80-column Ultraterm video board has the following advantages over the 80-column Videoterm video board:

*Flicker free, very high quality display

*Built in inverse; highlight; and lowlight

*Built in 80/40 column mode switching

*Multiple display modes

*Extra connector for RGB output boards

*Compatible with the //e, even when an extended memory card is installed

The Ultraterm also has the following disadvantages:

The Ultraterm costs about $100 more than a comparable Videoterm. There is no graphics-mode detect.

The card is compatible with Pascal, CP/M, DOS, Pro-DOS, and even SOS on the Apple ///. From DOS it turns on, using the standard PR#3 command. When it is first turned on it enters the "Videoterm emulation mode." In this mode most BASIC, and many machine language programs which were written for the Videoterm, will work. Most programs which didn't work directly with the Ultraterm now have new updates to make them compatible. Videx supports users of Applewriter and Visicalc with lowcost "preboot" diskettes, and the manual includes step by step directions to modify Wordstar to use the full page (80x48) display.

The different character modes can be changed either from a program or from "command mode." The following different modes are available:

*80x24 Videoterm emulation
*96x24
*160x24 four times as much text as the normal Apple display
*80x24 with the high quality character set
*80x32
*80x48 an entire page of word processing text
*132x24
*128x32

Screen attributes can be set to any permutations of inverse, normal, lowlight, and highlight. The cursor can be set under user control from a line to a block, in either flashing mode (several different rates) or solid mode.

Modifying a program to use the Ultraterm is usually as simple as putting in the line:

```
PRINT CHR$(4);"PR#3"
PRINT CHR$(22);X
```

Where X is the mode you wish.

The last five modes use an "interlace mode" with a higher quality character set (8x12 matrix), where odd lines are scanned on odd cycles and even lines are scanned on even cycles. This causes the screen to bounce thirty times a second. With a monitor which "ghosts" when data is quickly changed like the Apple Monitor /// the high persistence of the screen balances out the bouncing. I highly recommend trying out the ULTRATERM in all the modes you plan to use with the monitor you plan to use before buying the combo. Some monitors will require internal adjustments of the horizontal width in order to display all of the characters. Considering that most monitors have greater than 10,000 volts inside the case; you might want to have a technician adjust the monitor for you.

Since the Ultraterm has its own "built in softswitch" it can't tell whether the Apple is in text or graphics mode. With an original Videoterm card and a softswitch, whenever any graphics mode was selected, the monitor would automatically switch to the graphics display. With the Ultraterm, you must first, manually shut off the card from your program, and then turn on the graphics modes. Fortunately there are two solutions:

1) Use a separate monitor for graphics. Although fairly expensive, this is a very good choice. Whenever you use your Ultraterm, whether for spreadsheet, word processing, data communications, or programming, you will want as clear a monochrome display as possible. Whenever you use graphics you'll want a bright colorful display. I use a color television set, connected via a R-F modulator and a black and white monitor attached to the Ultraterm. This combination also gives another advantage. I can program a graphics screen, and view the coordinates in 80-column mode, while seeing the results on the color screen at the same time.

2)If you only want to use one screen, then you can buy a softswitch designed for the Videoterm. Fortunately, the Ultraterm can use it also.

Although commercial software has not come out yet, using the full capabilities of the Ultraterm (High speed Lisa like "office desktop screens") the Ultraterm outperforms every other text display device available for the Apple. I highly recommend it for anybody who does word processing, spreadsheet work, or for any other reason, needs an extended display device for an Apple. ●

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Brainworks, Inc. Introduces Four New Products

"Chipwits"

A highly teachable robot that follows preset instruction sets and runs on the Macintosh and Lisa II computers is featured in "Chipwits" -- a totally new concept in learning software being introduced by Brainworks, Inc.

Hailed as the first program of its kind, Chipwits features robots which are programmed by the user with illustrated "chips" using icon selection in combinations that give the robots an almost unlimited variety of human-like qualities and behavior patterns. Once a Chipwits robot is programmed, he can be sent on a series of complex and often dangerous missions of increasing difficulty.

Designed to run on both versions of the Macintosh and on Lisa II computers, Chipwits features over 1,000,000 possible user-defined behavioral combinations that can be built into the robot hero of this adventuresome program. Up to 12 robots can be programmed at a time.

The Chipwits robot is programmed in the "workshop" to do almost anything: sniff out a cup of coffee and drink it; look for a door and walk through it; zap an enemy; feel for objects; even sing songs. To make the robot do these things, you program the chips, using illustrated icons to define behavior and reactions. Either-or situations are easily built in, which lays the groundwork for learning computer-type logic.

Chipwits makes maximum use of the special qualities and characteristics of the Macintosh computer, including its fast processing, large memory, high-resolution screen, and mouse pointer. Priced at just $39.95, a second version will soon be available for the Apple IIe and IIc computers.

Because of the nature of this new software package, Chipwits will also serve as the user's introduction to the concepts of artificial intelligence, an area that is rapidly becoming a major goal of computer software.

The manual for this program is extensive and is much more than just a program instruction book. Well over 100 pages long, it will also enhance the educational value of the software and will play an important role in introducing the user to artificial intelligence.

"TeleChess"

For the first time, two people can play chess over the telephone and, using modems, actually see every move on both computer screens simultaneously.

TeleChess has introduced a breakthrough development in telecommunications software that allows **animated** graphics to be transmitted in both directions in "real time" (instantly, as it happens). Thus, both players, though they be miles apart, see each other's moves as they are made, in color.

The chess graphics are integrated with the communications software on a single diskette. Each player must have a diskette. A built-in installation program allows each player to customize the communications software for the particular modem he or she is using.

TeleChess is initially available for Apple II Series computers. Later versions will be available for the Macintosh and IBM-PC.

In addition to full color graphics, TeleChess provides a "chat" mode that lets each player communicate with his opponent without affecting the game. Chess pieces can be moved either with cursor control or with a joystick. Screens are printable at any time, and games may be saved on the program disk.

The TeleChess package, consisting of two diskettes and instruction booklet, will be sold at a retail price of $69.95. The booklet includes an extensive background on the game of chess, lessons, and play-by-play moves of many classic championship encounters.

TeleChess is the first communications software that allows high quality color graphics to be transmitted via modem connection. Brainworks executives state that the same technology has unlimited applications and can be used for transmitting any graphics. They are planning a full line of products using the system. In addition, the company will license the system to other software publishers.

"Torpedo Run"

An accurate reproduction of the control system and response of an attack submarine are key features of a new program, "Torpedo Run," for the IBM-PC computer.

While at first glance Torpedo Run looks like a complex war game, it offers a definite learning experience because of the accurate way it replicates the controls and operations of an actual submarine.

Written initially for the IBM-PC by a sub commander, Capt. Thomas Gale, Ret. USN, Torpedo Run helps develop real-life skills in keeping the sub operating and zeroing in on enemy vessels with appropriate commands to the vessel's computer control system.

The program contains numerous parameters to be handled including evasive action, depth, damage control, speed, direction, and angle. It includes a sonar display for maneuvering and control.

The program in its IBM version carries a retail price of $39.95. Translations for the Macintosh and the Apple II series will follow, according to the company president.

"BrainTrain"

BrainTrain, a revolutionary new computer software program for memory training, is designed to strengthen a person's ability to retain verbal and numeric information (left brain), and abstract visual information (right brain).

The program was developed by Sherwin A. Steffin, an educational technologist and president of Brainworks. Designed to be more than a memory training program, it leads to a better understanding of the functions of the brain's two hemispheres, and lets users

Continued on page 66

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We have 8Kx8 static RAMs: HITACHI HM6264-P-15, HM6264LP-15, and the TOSHIBA TC5565PL-15. These are 28 pin devices compatible with 2764 EPROMs. Both the Hitachi and Toshiba parts are pin compatible. After a brief discussion by phone with both company offices, we are under the strong impression the Toshiba part is slightly better. Both brands have two chip selects, and go into low power mode when only either chip select is disabled. Both Hitachi devices, the P-15 and LP-15, are the very same part, made the same way at the same time, however, the LP device is culled out or tested as being a lower power device. The Toshiba PL-15 and Hitachi LP-15 appear to have identical specs.

QUASI-DISK, a ram-disk
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Quasi-Disk is a .5 MByte S-100 bus RAM memory card which is supplied with software to allow the board to emulate a floppy disk drive with response times considerably faster than a floppy.

Because RAM can be accessed approximately 1,000-fold faster than a floppy diskette you will enjoy over all response times perhaps 35 faster than your current floppy disk system. Programming becomes more of a pleasure because your time is more productive.

This card requires 64 of the 64K or 256K Dynamic RAM ICs, which is 524,288 bytes or 2,096,912 bytes of RAM respectively. This RAM array is accessed via six I/O ports.

Software is currently available only for CP/M systems.

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**CAUTION: Do not program the 2732A in a 2732 socket: The suffix A requires 21 v max programming voltage vs the standard 25 v.

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New Graphics Tablet With Printer/Dump & Character Set

Animation Station, the new graphics tablet from Suncom, comes with two features—printer/dump and a built-in character set—which significantly enhances its usefulness in the home, classroom and office.

Without having to buy extra software or accessories, users can perform a variety of entertainment, education and business functions with this touch-sensitive graphics tablet and computer cursor controller. Animation Station, which also serves as a graphics and text processor, is available in two versions: for Apple and Commodore computers.

Because Animation Station comes with a built-in character set—complete with several type fonts—users can professionally label business presentations and school reports. In the classroom this feature allows teachers to create lessons that are visually exciting enough to hold the attention of students who are accustomed to electronically-sophisticated graphics.

The product's printer/dump feature also facilitates educational business and other functions. By connecting the Animation Station to one of a number of popular printers, users can make instant copies of whatever they've drawn on their screen.

In addition to its practical applications, this versatile product can be used for fun. Its wide range of graphics effects are perfect for portraits, abstract pictures, illustrations of any kind. Owners can also use Animation Station to write—and illustrate—letters, draw maps, design room layouts and perform hundreds of other creative tasks.

Animation Station, the new graphics tablet from Suncom

Included free with Animation Station is an innovative, color software program from Baudville called DesignLab. Along the same lines as Apple's MacPaint, DesignLab has a built-in cut and paste feature which allows the user to electronically reposition elements on the screen.

Additional software programs are available, including: Take One, a program which creates animated movies; Spellbound, a spelling aid for primary school students; and Shape Library I, an electronic clip art book containing many different educational, business, engineering and design shapes as well as a dramatically expanded library of type faces and character sets. Shape Library significantly enhances Animation Station's use for business and school presentations.

Animation Station's exclusive design features side-mounted, dual left- and right-hand function buttons and ergonometrically superior housing, as well as a joystick emulator feature not found on other graphics tablets.

Animation Station is distributed through specialty retailers and mass merchants throughout the U.S. and abroad. Its suggested retail price is $89.95 for the Apple version and $79.95 for the Commodore version.

For more information, contact Suncom, 260 Holbrook Drive, Wheeling, IL 60090. ●

Brainworks
Continued from page 64

determine whether they are left or right brain dominant. Further, by providing performance feedback and scores in response to a variety of stimuli, the program enables a person to concentrate on strengthening his or her "weaker" hemisphere.

The new program, initially available for the Macintosh and Lisa at a retail price of $39.95, will also soon be released for the Apple II series of computers. It lets the user differentiate between left- and right-brain activity (left is primarily for verbal and numeric information; the right processes visual data) and helps to increase memory skills for both kinds of stimuli.

It does this by presenting stimuli at different difficulty levels -- first in the left brain (if you choose to start there), then the right brain, and then together with multiple stimuli.

The program lets you pick your own parameters -- first choosing left- or right-brain dominance, then assigning a "courage" factor. A timid person will choose a low level of courage; a high risk-taker will take a high courage level. Then, depending on your courage level, your score will accelerate more (and decrease faster) with high levels than with low levels. In this way, the program also evaluates the user's risk-taking propensity.

The program also permits adjusting the difficulty level, and while making this increase, the user also increases his or her ability to process and store the kinds of stimuli being received.

The left side exercise starts with some vowel-free nonsense syllables, and continues with complete words requiring comparisons. Then you compare sets of digits, remember them, and key them back into the computer.

The right-side exercise provides pattern testing matrices which have to be re-created from selections of building blocks and materials provided. Then the two sets are combined to create more complex problems. ●

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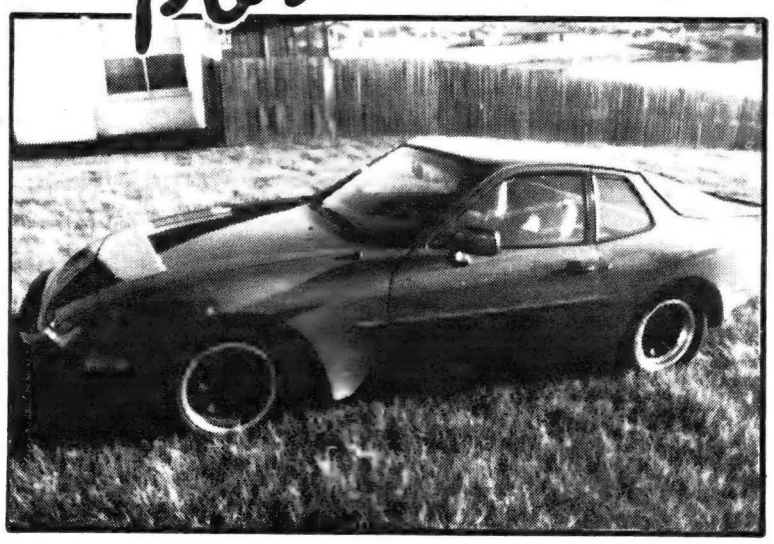

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Microsoft Announces New Version Of Basic For Macintosh

Microsoft Corporation announces the release of Version 2.0 of Microsoft® BASIC for the Apple® Macintosh™. Programs created with this new version can access the mouse, pull-down menus, multiple windows and dialog boxes, buttons, sound effects and music, graphics and QuickDraw routines for font, text, and cursor support.

Microsoft BASIC is the most widely-used programming language available on microcomputers today. It is found on personal computers developed by IBM, AT&T, Digital Equipment, Tandy, Texas Instruments, Commodore, and others. Microsoft BASIC 2.0 offers Macintosh users the traditional ease of use found in BASIC 1.0, as well as many new features that take advantage of the Macintosh's unique capabilities.

Full Support of Macintosh-Style Features

With this new version of Microsoft BASIC, programs can be customized to incorporate a full complement of Macintosh-style features. BASIC programs can include user defined pull-down menus, and specify the size, type, and location of windows. Interactive devices like buttons and "edit fields" can be used to construct dialog and alert boxes.

Like Microsoft BASIC 1.0, Microsoft BASIC 2.0 can be used to write programs that interact with the Macintosh mouse. The MOUSE function reads the horizontal and vertical position of the mouse pointer and the status of the mouse button (button up/down, click, double-click, triple-click, and drag).

Editing and Debugging Enhancements

Entering programs is straightforward with Microsoft BASIC. Programs are typed directly into a "list" window. As program lines are entered, BASIC statements and functions are automatically highlighted, making the program easier to read. Vertical and horizontal scrolling allows easy viewing of any part of a program.

Programs can be edited directly in the window with the standard Macintosh CUT, PASTE, and COPY commands. Dragging the mouse selects program text to be cut, copied, deleted, etc. CUT deletes the text from the window and puts it on the Macintosh Clipboard. New text can then be entered from the keyboard or retrieved from the Clipboard using the PASTE command. COPY puts the selected text on the Clipboard without deleting it from the window.

A second program listing window can be displayed making it possible to view or edit separate parts of a program simultaneously.

In Microsoft BASIC 2.0, line numbers for each program statement are optional. Alphanumeric labels can be used instead to reference single lines or sections of code. For example, a subroutine that calculates interest can be labeled calcinterest. Other program statements may reference the subroutine by name.

BASIC's new Search menu provides a full range of options to find and replace program text. The user can search for specific text, a label, or the current position of the editing cursor. Selected text can be automatically replaced for a single occurrence or throughout the entire program.

As a major aid to program debugging Microsoft BASIC 2.0 includes an enhancement to the TRACE command. If TRACE is selected each program line is highlighted in the List window as it is executed. This allows the simultaneous viewing of program flow and output.

The additional STEP option executes a single line. The value of specific variables can

Continued on page 69

SoftStyle's Epstart™ Software Marries Epson™ Printers To Apple® Macintosh™

SoftStyle™, Inc., now lets Macintosh™ owners use Epson™ printers with their systems. A software utility lets Epson FX- and JX-series printers (and compatibles) produce text and graphics, replacing an Apple® Imagewriter. Epstart™ printer control software is available for $39.95 (suggested US resale) at participating SoftStyle dealers; dealer inquiries invited.

Epstart modifies the standard Macintosh printer drivers to support many of the popular Epson printers. It is compatible with most application software using Macintosh printing standards, including MacPaint, MacWrite™, MultiPlan® , Microsoft™ BASIC and others. Epstart also permits printing everything displayed on the Macintosh screen at any time.

Epstart must be installed on each Macintosh application disk; this is as easy as copying it onto the disk and identifying the printer for which it will be configured. Once installed, applications run normally and Epstart is totally transparent to the user.

Epstart requires a Macintosh, standard printer cable and Epson JX-80, FX-80 or FX-100 printer with an 8143, 8145, 8148 or equivalent serial interface.

For additional information, contact SoftStyle, Inc., 7192 Kalanianaole Highway, Suite 205, Honolulu, HI 96825.

Mention that you read it in Computer Shopper. ●

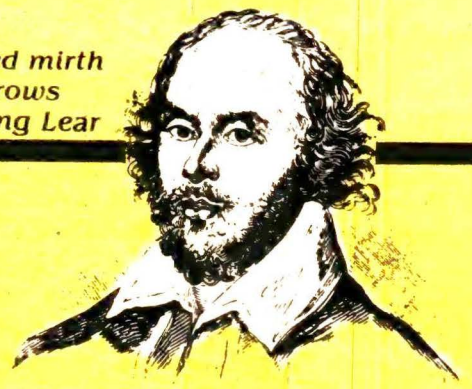
Modem Problems With Apple //c, Fixed By Apple

Many members of the Apple SIG on CompuServe have had trouble connecting their modems to Apple //c. It seems that the Apple modem is the only modem that works properly with this computer. The problem seems to be in the timing of the serial port on the computer. Some users report that their modems will work at 300 baud on the networks, but have problems at 1200 baud.

Apple Computer knows about the problem and dealers will help resolve the trouble. They will remove the Apple motherboard and send it to Apple for modification. This is supposed to be a free service. Apple takes a couple of weeks to upgrade the board and return it to your dealer.

Even though you hate to be without your computer for the repair time, it pays to have the upgrade done while Apple is doing the work at no charge. This can only be done through an authorized Apple dealer. Do not send anything directly to Apple. ●

At Christmas I nq more desire a rose
Than wish a snow in May's new fangled mirth
But like of each thing that in season grows
—King Lear



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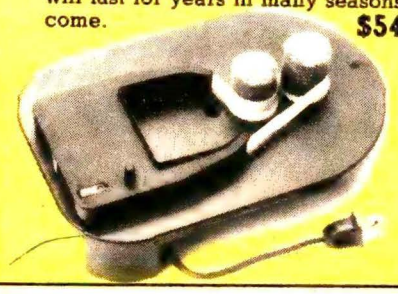

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Infocom Goes To The Office

by Barbara Nathan

Infocom, the people who brought us the Zork series and many other best selling text adventure games, has announced their entry into the Business Applications software market with Cornerstone, a full featured relational data base system.

Cornerstone, due for release on January 31, 1985, will be available initially for IBM and IBM compatible computers. Cornerstone has been designed for the business professional who is a non-programmer.

The Infocom corporation has been an industry leader, producing interactive fiction software products since their founding in 1979. With the release of Cornerstone, the Massachusetts-based corporation hopes to claim their share of the business market and has aimed this first effort at the professional who needs a data base for individual needs such as sales lead tracking, customer support and personnel management.

The newly-created Infocom Business Application software team stresses that this $495 data base has been created with the non-programmer in mind. The five-disk package includes a Beginner's Guide, which is a ten-lesson ring-bound tutorial, to be used in conjunction with their On-Screen Tutorial. Additionally, there is a three hundred-page Owner's Handbook to aid the experienced data base designer in creating powerful sophisticated relational data bases.

Two keys, "Help" and "Options" are always available. These keys provide an on-screen look at the Owner's Handbook, open to the right page, right on your screen. Infocom will also be providing a telephone support line for Cornerstone.

Available initially on the IBM PC, PC/XT, PC/AT and IBM compatible computers, Cornerstone can be used in conjunction with Wordstar, Lotus 1-2-3, and many other IBM compatible spreadsheets and word processors. Cornerstone also runs under Topview, IBM's new multi-tasking windowing software.

Cornerstone also permits the conversion of files from other data base software, including dBaseII and PFS.

A multi-million dollar advertising campaign is planned to introduce Cornerstone to the business world. Five distributors, First Software, Micro D, Softeam, Softsel and Software Distribution Services, will be handling the distribution of Cornerstone. ●

Microsoft cont. from page 68

then be inspected with the Command window which also permits direct execution of BASIC statements.

Graphics and Sound Support

Microsoft BASIC 2.0 provides three different avenues of graphics support. The first is BASIC's graphics statements, including PSET, PRESET, LINE, CIRCLE, and POINT which are used to draw points, lines, boxes, elipses and circles. In addition the GET and PUT statements can be used to create the effect of animation.

BASIC also provides access to QuickDraw routines for selecting font characteristics, patterns, cursor shape, as well as a variety of graphic shapes (rectangles, rounded rectangles, ovals, arcs, and irregular polygons).

Graphic images created in MacPaint™ and pasted on the Macintosh Clipboard can be retrieved by BASIC and used in programs.

Microsoft BASIC provides access to the built-in musical capabilities of the Macintosh. Programs can produce a variety of sounds and tones. The SOUND statement specifies the frequency, duration, and volume of four possible "voices" or channels. The WAVE statement allows the user to define custom wave shapes for each voice independently.

Advanced Programming Functions Add Depth to BASIC

Microsoft BASIC includes a number of advanced features that make it ideal for writing software applications. Structured program constructs such as WHILE/WEND, IF-/THEN/ELSE, and subprograms are supported. For example, subprograms are subroutines that are called by name and passed parameters from the main program. Variables can be shared with the main program or be local to the subprogram.

Event trapping allows a program to transfer control to a specific program line when "events" occur. These events include window activity (e.g. pressing a button, closing a window), menu selection, elapsed time or mouse status change.

Device-independent I/O is also included. BASIC's file handling statements can be used to direct I/O to and from the screen, keyboard, printer, communications port or the Macintosh Clipboard.

Available from Retail Outlets

Microsoft BASIC 2.0 for the Macintosh will be available for a suggested retail price of $150. Upgrades will also be offered to current owners of previous versions of Microsoft BASIC for a minimal fee. Registered owners will be notified by mail, others should contact Microsoft Customer Service.

For more information, contact Microsoft Corporation, 10700 Northup Way, Box 97200, Bellevue, WA 98009

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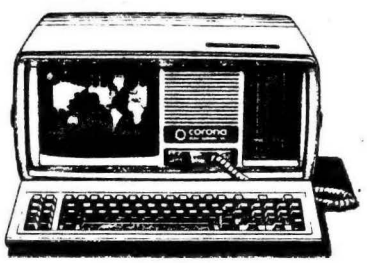

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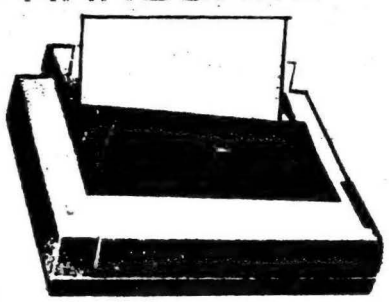

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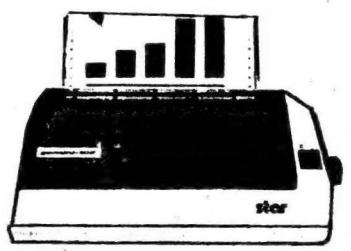

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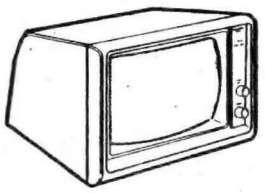

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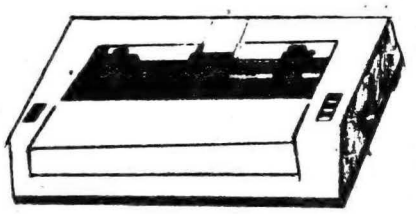

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74S244	20	2.19
74S251	16	.99
74S253	16	.99
74S257	16	.99
74S258	16	.99
74S260	14	.79
74S273	20	2.39
74S280	14	1.89
74S287*	16	1.79
74S288*	16	1.79
74S299	20	5.95
74S373	20	2.49
74S374	20	2.49
74S387*	16	1.95
74S471*	20	4.95
74S472*	20	4.95
74S473*	20	4.95
74S570*	16	2.95
74S571*	16	2.95
74S572*	18	4.95
74S573*	18	4.95

CA—LINEAR

Part No.	Pins	Price
CA3010H		1.09
CA3039H		1.25
CA3046N	14	.99
CA3059N	14	2.95
CA3060N	16	2.95
CA3065E	14	1.49
CA3080E	8	.99
CA3081N	16	1.15
CA3082N	16	1.15
CA3083N	16	1.15
CA3086N	14	.85
CA3089N	16	1.95
CA3096N	16	1.75
CA3130E	8	1.19
CA3140E	8	.85
CA3160H		1.79
CA3160E	8	1.49
CA3161E	16	1.79
CA3162E	16	6.95
CA3189E	16	2.79
CA3401N	14	.59

CD—CMOS

Part No.	Pins	Price
CD4001	14	.29
CD4002	14	.29
CD4006	14	.89
CD4007	14	.29
CD4008	16	.89
CD4009	16	.59
CD4010	16	.49
CD4011	14	.29
CD4012	14	.29
CD4013	14	.39
CD4014	16	.89
CD4015	16	.39
CD4016	14	.49
CD4017	16	.79
CD4018	16	.79
CD4019	16	.49
CD4020	16	.75
CD4021	16	.75
CD4022	16	.75
CD4023	14	.29
CD4024	14	.69
CD4025	14	.29
CD4026	16	1.59
CD4027	16	.45
CD4028	16	.69
CD4029	16	.79
CD4030	14	.39
CD4034	24	1.79
CD4035	16	.79
CD4040	16	.75

(More in Catalog)

Part No.	Pins	Price
CD4041	14	.69
CD4042	16	.69
CD4043	16	.79
CD4044	16	.79
CD4046	16	.89
CD4047	14	.89
CD4048	16	.59
CD4049	16	.39
CD4050	16	.39
CD4051	16	.79
CD4052	16	.89
CD4053	16	.79
CD4056	16	2.95
CD4059	24	3.95
CD4060	16	.89
CD4066	14	.45
CD4068	14	.39
CD4069	14	.35
CD4070	14	.29
CD4071	14	.29
CD4072	14	.29
CD4073	14	.29
CD4077	14	.35
CD4078	14	.49
CD4081	14	.29
CD4093	14	.49
CD4094	16	1.95
CD4098	16	1.95
CD4099	16	1.89

Part No.	Pins	Price
CD4503	16	.69
CD4506	16	1.29
CD4507	14	1.19
CD4508	24	1.95
CD4510	16	.85
CD4511	16	.85
CD4512	16	.85
CD4514	24	1.49
CD4515	24	1.49
CD4516	16	.89
CD4518	16	.89
CD4519	16	.59
CD4520	16	.89
CD4526	16	1.19
CD4528	16	1.19
CD4529	16	1.69
CD4531	16	.89
CD4538	16	1.49
CD4541	14	1.49
CD4543	16	1.19
CD4562	14	6.95
CD4566	16	2.95
CD4583	16	2.49
CD4584	14	.59
CD4723	16	1.19
CD4724	16	1.19
MC14410	16	8.95
MC14411	24	11.95
MC14412	16	7.95
MC14433	24	17.95
MC14572	16	1.19

74F00

Part No.	Pins	Function	Price
74F00	14	Quad 2-Input NAND Gate	.69
74F02	14	Quad 2-Input NOR Gate	.75
74F04	14	Hex Inverter	.89
74F08	14	Quad 2-Input AND Gate	.75
74F10	14	Triple 3-Input NAND Gate	.75
74F32	14	Quad 2-Input OR Gate	.79
74F74	14	Dual D Flip-Flop	.85
74F86	14	Quad Exclusive OR Gate	1.15
74F109	16	Dual JK Positive Edge Flip-Flop	.95
74F138	16	Expandable 3/8 Decoder	1.69
74F157	16	Quad 2-Input Multiplexer	1.69
74F158	16	Quad 2-Input Multiplexer (Inv.)	1.69
74F193	16	4-Bit Up/Down Binary Counter	5.29
74F240	20	Tri-State Octal Line Driver (Inverting)	3.75
74F244	20	Tri-State Octal Line Driver	3.49
74F257	16	Tri-State Quad 2-Input Multiplexer	1.79
74F373	20	Tri-State Octal Latch	4.89
74F374	20	Tri-State Octal D Flip-Flop	4.59

NEW 74ALS00

Part No.	Pins	Function	Price
74ALS00	14	Quad 2-Input NAND Gate	.59
74ALS02	14	Quad 2-Input NOR Gate	.59
74ALS04	14	Hex Inverter	.59
74ALS08	14	Quad 2-Input AND Gate	.59
74ALS10	14	Triple 3-Input NAND Gate	.59
74ALS30	14	8-Input NAND Gate	.59
74ALS32	14	Quad 2-Input OR Gate	.65
74ALS74	14	Dual D Flip-Flop	.79
74ALS109	16	Dual JK Pos. Edge Flip-Flop	.79
74ALS138	16	Expandable 3/8 Decoder	1.25
74ALS240	20	Tri-State Octal Line Driver (Inverting)	2.25
74ALS244	20	Tri-State Octal Line Driver	2.25
74ALS245	20	Octal Bus Transceiver (Non-Inv.)	2.59
74ALS373	20	Tri-State Octal Latch	2.59
74ALS374	20	Tri-State Octal D Flip-Flop	2.59

MICROPROCESSOR COMPONENTS

MICROPROCESSOR CHIPS

Part No.	Pins	Function	Price
D765AC	40	Floppy Disk Controller	19.95
D3242	28	Addr. Multiplexer & Refresh Counter	7.95
TMS5501	40	Synchronous Data Interface (SIRC)	14.95

Z80, Z80A, Z80B, Z8000 SERIES

Part No.	Pins	Function	Price
Z80	40	CPU (MK3880N) (780C) 2MHz	2.95
Z80-CTC	28	Counter Timer Circuit	3.49
Z80-DART	40	Dual Asynchronous Rec./Trans.	8.95
Z80-DMA	40	Direct Memory Access Circuit	12.49
Z80-P10	40	Parallel I/O Interface Controller	3.49
Z80-S10/0	40	Serial I/O (TxCB and RxCB Bonded)	11.49
Z80-S10/1	40	Serial I/O (Lacks DTRB)	11.49
Z80-S10/2	40	Serial I/O (Lacks SYNCB)	11.49
Z80-S10/9	40	Serial I/O	11.49
Z80A	40	CPU (MK3880N-4) (780C-1) 4MHz	3.49
Z80A-CTC	28	Counter Timer Circuit	4.49
Z80A-DART	40	Dual Asynchronous Rec./Trans.	9.95
Z80A-DMA	40	Direct Memory Access Circuit	12.95
Z80A-P10	40	Parallel I/O Interface Controller	3.95
Z80A-S10/0	40	Serial I/O (TxCB and RxCB Bonded)	11.95
Z80A-S10/1	40	Serial I/O (Lacks DTRB)	11.95
Z80A-S10/2	40	Serial I/O (Lacks SYNCB)	11.95
Z80A-S10/9	40	Serial I/O	11.95
Z80B	40	CPU (MK3880N-6) 6MHz	8.95
Z80B-CTC	28	Counter Timer Circuit	11.95
Z80B-DART	40	Dual Asynchronous Rec./Trans.	19.95
Z80B-P10	40	Parallel I/O Interface Controller	10.95
Z8001B	48	CPU Segmented (10MHz)	79.95
Z8002B	40	CPU Non-Segmented (10MHz)	59.95

6500/6800/68000 SERIES

Part No.	Pins	Function	Price
6502	40	MPU with Clock (1MHz)	4.95
6502A	40	MPU with Clock (2MHz)	6.49
6502B	40	MPU with Clock (3MHz)	8.95
6520	40	Peripheral Inter. Adapter	3.95
6522	40	Peripheral Inter. Adapter	5.49
6551	28	Async. Comm. Interface Adapter	10.95
6800	40	MPU	2.95
6802CP	40	MPU with Clock and RAM	7.95
6809	40	CPU — 8-Bit (On-Chip Oscillator)	8.95
6809E	40	CPU — 8-Bit (External Clocking)	9.95
68B09E	40	CPU — 8-Bit (Ext. Clocking) 2MHz	14.95
68B10	24	128x8 Static RAM (2MHz)	5.95
6821	40	Peripheral Inter. Adapt. (MC6820)	2.95
68B21	40	Peripheral Interface Adapter (2MHz)	5.95
6845	40	CRT Controller (CRTC)	14.95
68B45	40	CRT Controller (CRTC) 2MHz	19.95
6850	24	Asynchronous Comm. Adapter	3.95
6860	24	0-600bps Digital MODEM	7.95
68000L8	64	MPU 16-Bit (8MHz)	39.95
68488P	40	General Purpose Int. Adapter	9.95

8000/80000 SERIES

Part No.	Pins	Function	Price
8031	40	Control Oriented CPU w/RAM & I/O	14.95
8035	40	MPU — 8-Bit	5.95
8039	40	CPU—Sgl. Chip 8-Bit (128Bts. RAM)	5.95
8040N-6	40	CPU (256 bytes RAM)	9.95
8060	40	CPU — 8-Bit NMOS	14.95
8070N	40	CPU (64 bytes RAM)	19.95
8073N	40	CPU w/Basic Micro Interpreter	29.95
8080A	40	CPU	3.95
8085A	40	CPU	4.95
8086-2	40	CPU 16-bit 8MHz	24.95
8087	40	Arithmetic Processor	189.95
8088	40	CPU 8/16-Bit	19.95
8155	40	HMOS RAM 1/0 Port-Timer	6.95
8156	40	RAM with I/O Port and Timer	8.95
8205	16	Hi Speed 1 out of 8 Binary Decoder	3.95
8212	24	8-Bit Input/Output (74S412)	2.95
8224	16	Clock Generator/Driver	2.95
8228	28	System Cont./Bus Driver (74S428)	4.95
8237-5	40	High Perf. Prog. DMA Cont. (5MHz)	19.95
8238	28	System Controller (74S438)	4.95
8243	24	I/O Expander for 48 Series	4.95
8250N	40	Async. Comm. Element	10.95
8251	28	Prog. Comm. I/O (USART)	4.95
8251A	28	Prog. Comm. Interface (USART)	7.95
8253	24	Prog. Interval Timer	6.95
8255	40	Prog. Peripheral I/O (PPI)	4.95
8255A-5	40	Prog. Peripheral I/O (PPI) 5MHz	7.95
8259	28	Prog. Interrupt Control	5.95
8272	40	Sgle/Dble Density Floppy Disk Cont.	19.95
8274	40	Multi-Protocol Serial Cont. (7201)	29.95
8279	40	Prog. Keyboard/Display Interface	6.95
8282	20	Octal Latch	8.95
8284	18	Clock Generator/Driver	6.95
8286	20	Octal Bus Transceiver	7.95
8287	20	Octal Bus Transceiver (Inverted)	7.95
8288	20	Bus Controller	19.95
8303	20	8-Bit Tri-State Bi-Directional Trans.	3.49
8304	20	8-Bit Bi-Directional Receiver	3.49
8310	20	Octal Latched Peripheral Driver	3.95
8741	40	8-Bit Univ. Peripheral Interface	29.95
8748	40	HMOS EPROM MPU	39.95
8749	40	MPU 8-Bit (EPROM Version of 8049)	39.95
8755	40	16K EPROM with I/O	39.95
80186-6	68	High Integration 16-Bit MPU	99.95

DISK CONTROLLERS

Part No.	Pins	Function	Price
INS1771-1	40	Single Density	16.95
FD1791	40	Single/Dual Density (Inv.)	24.95
FD1793	40	Single/Double Density (True)	26.95
FD1795	40	Dual Density/Side Select (Inv.)	26.95
FD1797	40	Dual Density/Side Select (True)	29.95

SPECIAL FUNCTION

Part No.	Pins	Function	Price
DS0026CN	8	Dual MOS Clock Driver (5MHz)	1.95
INS2651	28	Communication Chip	7.95
MC3470P	18	Floppy Disk Read Amp System	4.95
MM5321N	16	TV Camera Sync. Generator	9.95
MM54240N	24	Asynchronous Transmitter/Receiver	5.95
MM58167AN	24	Microprocessor Real Time Clock	8.95
MM58174AN	16	Micro. Compatible Time Clock	8.95
MM5369AA/N	8	Prog. Oscillator/Divider (60Hz)	1.79
MM5369EST	8	Prog. Oscillator/Divider (100Hz)	1.95

DYNAMIC RAMS

Part No.	Pins	Function		Price
1103	18	1024x1	(300ns)	.99
4027	16	4096x1	(250ns)	1.49
4116N-2	16	16,384x1	(150ns)	1.39 — 8/10.95
4116N-3	16	16,384x1	(200ns)	1.15 — 8/8.95
4116N-4	16	16,384x1	(250ns)	.89 — 8/6.95
4164N-150	16	65,536x1	(150ns)	5.19 — 8/40.95
4164N-200	16	65,536x1	(200ns)	4.95 — 8/38.95
MM5261	18	1024x1	(300ns)	.35 — 8/1.95
MM5262	22	2048x1	(365ns)	.10
MM5270	18	4096x1	(250ns) MK4096	4.95
MM5280	22	4096x1	(200ns) 2107	3.95
MM5298-3	16	8192x1	(200ns)	.59
41256	16	262,144x1	(200ns)	31.95

STATIC RAMS

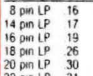
Part No.	Pins	Function		Price
2101	22	256x4	(450ns) 8101	1.95
2102	16	1024x1	(350ns)	.89
2102-2L	16	1024x1	(250ns) L.P. (91L02)	1.49
2111	18	256x4	(450ns) 8111	2.49
2112	16	256x4	(450ns) MOS	2.49
2114N	18	1024x4	(450ns)	1.29 — 8/9.95
2114N-L	18	1024x4	(450ns) L.P.	1.95 — 8/13.95
2114N-2	18	1024x4	(200ns)	1.39 — 8/10.95
2114N-2L	18	1024x4	(200ns) L.P.	1.69 — 8/13.49
2147HN	18	4096x1	(70ns)	4.49
2148HN	18	1024x4	(70ns)	4.95
TMS4045	18	1024x4	(450ns)	3.95
TMS40L47-45	20	1024x4	(450ns)	1.95
5101	22	256x4	(450ns) CMOS	3.95
MM5257	18	4096x1	(450ns) 4044	4.95
HM6116P-2	24	2048x8	(120ns) CMOS	7.95
HM6116LP-2	24	2048x8	(120ns) L.P. CMOS	8.95
HM6116P-3	24	2048x8	(150ns) CMOS	4.95
HM6116LP-3	24	2048x8	(150ns) L.P. CMOS	6.49
HM6116P-4	24	2048x8	(200ns) CMOS	4.75
HM6116LP-4	24	2048x8	(200ns) L.P. CMOS	5.49
HM6264P-12	28	8192x8	(120ns) CMOS	37.95
HM6264LP-12	28	8192x8	(120ns) L.P. CMOS	39.95
HM6264P-15	28	8192x8	(150ns) CMOS	34.95
HM6264LP-15	28	8192x8	(150ns) L.P. CMOS	37.95
27LS00	16	256x1	(80ns) L.P.	3.95
7489	16	16x4	(50ns) 3101	2.25
74C921	18	256x4	(250ns) CMOS	5.95
74C930	18	1024x1	(250ns) CMOS (6518)	5.95
74S189	16	16x4	(35ns) 93405	2.95
74S289	16	16x4	(35ns) 3101	2.95
82S10	16	1024x1	(50ns) O.C. (93415)	3.95
82S25	16	16x4	(50ns) O.C. (74S289)	2.25

PROMS/EPROMS

Part No.	Pins	Function		Price
1702A	24	256x8	(1μs)	3.95
2708	24	1024x8	(450ns)	3.95
2708-5	24	1024x8	(550ns) SM00246	3.49
TMS2516	24	2048x8	(450ns) 2716	4.95
TMS2532	24	4096x8	(450ns) NMC2532	5.49
TMS2564	28	8192x8	(450ns)	10.95
TMS2716	24	2048x8	(450ns) 3 voltage	7.95
2716	24	2048x8	(450ns)	3.95
27C16	24	2048x8	CMOS	14.95
2716-1	24	2048x8	(350ns)	5.49
27160-5	24	2048x8	(550ns)	3.75
2732	24	4096x8	(450ns)	4.95
2732-20	24	4096x8	(200ns)	10.95
2732A-20	24	4096x8	(200ns) 21V	11.49
2732A-25	24	4096x8	(250ns) 21V	7.19
2732A-45	24	4096x8	(450ns) 21V	6.49
27C32A-30	24	4096x8	(300ns) 21V (CMOS)	22.95
2764-20	28	8192x8	(200ns) 21V	14.95
2764-25	28	8192x8	(250ns) 21V	7.19
2764-45	28	8192x8	(450ns) 21V	6.49
27C64	28	8192x8	CMOS 21V	22.95
MCM68764	24	8192x8	(450ns) 21V	24.95
27128-25	28	16,384x8	(250ns) 128K Eprom 21V	21.95
27256-25	28	32,768x8	(250ns) 256K Eprom (14V)	99.95
74S188	16	32x8	PROM O.C. (6330-1)	1.75
74S287	16	256x4	PROM T.S. (6301-1)	1.79
74S288	16	32x8	PROM T.S. (6331-1)	1.79
74S387	16	256x4	PROM O.C. (6300-1)	1.95
74S471	20	256x8	PROM T.S. (6309-1)	4.95
74S472	20	512x8	PROM T.S. (6349-1)	4.95
74S473	20	512x8	PROM O.C. (6348)	4.95
74S474	24	512x8	PROM T.S. (DM87S296N)	4.95
74S475	24	512x8	PROM O.C. (6340)	4.95
74S476	18	1024x4	PROM T.S.	6.95
74S478	24	1024x8	PROM T.S.	9.95
74S570	16	512x4	PROM O.C. (6305)	2.95
74S571	16	512x4	PROM T.S. (6306)	2.95
74S572	18	1024x4	PROM O.C. (6352)	4.95
74S573	18	1024x4	PROM T.S. (82S137)	4.95
82S23	16	32x8	PROM O.C. (27S18)	2.95
82S115	24	512x8	PROM T.S. (27S15)	9.95
82S123	16	32x8	PROM T.S. (27S19)	2.95
82S126	16	256x4	PROM O.C. (27S20)	2.95
82S129	16	256x4	PROM T.S. (27S21)	2.95
82S130	16	512x4	PROM O.C. (27S12)	3.95
82S185	18	2048x4	PROM T.S. (TBP24S81)	9.95
82S191	24	2048x8	(80ns)	14.95
DM87S181N	24	1024x8	PROM T.S. (82S181)	9.95
DM87S184N	18	2048x4	PROM O.C. (82S184)	9.95
DM87S185N	18	2048x4	PROM T.S. (82S185)	9.95
DM87S191N	24	2048x8	PROM T.S. (82S191)	14.95

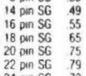
DATA ACQUISITION

Part No.	Pins	Function	Price
DC10		Mostek DC/DC Converter +5V to −9V	2.95
ADC0801	20	8-Bit A/D Converter (1/4LSB)	14.95
ADC0803	20	8-Bit A/D Converter (±1/2LSB)	4.95
ADC0804	20	8-Bit A/D Converter (1LSB)	3.49
ADC0808	28	8-Bit A/D Conv. w/8-Channel Analog	9.95
ADC0809	28	8-Bit A/D Converter (8-Ch. Multi.)	4.49
ADC0816	40	8-Bit A/D Conv. w/16-Channel Analog	14.95
ADC0817	40	8-Bit A/D Converter (16-Ch. Multi.)	9.49
DAC0806	16	8-Bit D/A Converter (0.78% Lin.)	1.95
DAC0807	16	8-Bit D/A Converter (MC1408-7)	1.49
DAC0808	16	8-Bit D/A Converter (MC1408-8)	2.25
DAC0830	20	8-Bit Up D/A Conv. (.05% Lin.)	5.95
DAC0831	20	8-Bit Up D/A Conv. (.10% Lin.)	4.49
DAC1000	24	10-Bit D/A Conv. Micro. Comp. (0.05%)	7.95
DAC1008	20	10-Bit D/A Conv. Micro. Comp. (0.20%)	6.95
DAC1020	16	10-Bit D/A Conv. (0.05% Lin.)	7.95
DAC1022	16	10-Bit D/A Conv. (0.20% Lin.)	5.95
DAC1222	18	12-Bit D/A Conv. (0.20% Lin.)	6.95
DAC1230	20	12-Bit Up D/A Conv. (.05% Lin.)	14.95
DAC1231	20	12-Bit Up D/A Conv. (.10% Lin.)	13.95
AY-5-1013A	40	30K Baud UART (TR1602)	3.95



Low Profile (Tin) Sockets

Part No.	1-9	10-99	100-up
8 pin LP	.16	.14	.13
14 pin LP	.17	.15	.14
16 pin LP	.19	.17	.16
18 pin LP	.26	.24	.23
20 pin LP	.30	.27	.25
22 pin LP	.31	.28	.26
24 pin LP	.33	.30	.28
28 pin LP	.40	.37	.35
40 pin LP	.49	.46	.43

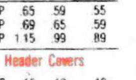


Soldertail (Gold) Standard

Part No.	1-9	10-99	100-up
8 pin SG	.39	.35	.29
14 pin SG	.49	.45	.39
16 pin SG	.55	.49	.45
18 pin SG	.65	.59	.51
20 pin SG	.75	.65	.59
22 pin SG	.79	.69	.65
24 pin SG	.79	.69	.65
28 pin SG	.95	.85	.75
36 pin SG	1.25	1.15	.99
40 pin SG	1.39	1.25	1.15

Wire Wrap Sockets (Gold) Level #3

Part No.	1-9	10-99	100-up
8 pin WW	.55	.49	.45
10 pin WW	.69	.65	.59
14 pin WW	.75	.69	.65
16 pin WW	.79	.72	.65
18 pin WW	.95	.85	.75
20 pin WW	1.19	1.09	.95
22 pin WW	1.29	1.19	1.05
24 pin WW	1.35	1.19	1.09
28 pin WW	1.69	1.55	1.39
36 pin WW	1.89	1.79	1.69
40 pin WW	2.29	1.95	1.79



Header Plugs (Gold)

Part No.	1-9	10-99	100-up
14 pin HP	.65	.59	.55
16 pin HP	.69	.65	.59
24 pin HP	1.15	.99	.89

Header Covers

Part No.	1-9	10-99	100-up
14 pin HC	.15	.13	.12
16 pin HC	.19	.17	.15
24 pin HC	.29	.25	.22

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Digitalker™

DT1050 — Applications: Teaching aids, appliances, clocks, automotive, telecommunications, language translations, etc.

The DT1050 is a standard DIGITALKER kit encoded with 137 separate and useful words, 2 tones, and 5 different silence durations. The words and tones have been assigned discrete addresses, making it possible to output single words or words concatenated into phrases or even sentences. The "voice" output of the DT1050 is a highly intelligible male voice. Female and children's voices can be synthesized. The vocabulary is chosen so that it is applicable to many products and markets.

The DT1050 consists of a Speech Processor Chip, MM54104 (40-pin) and two (2) Speech ROMs MM52164SSR1 and MM52164SSR2 (24-pin) along with a Master Word list and a recommended schematic diagram on the application sheet.

DT1050 Digitalker™ .... $34.95 ea.
MM54104 Processor Chip .... $14.95 ea.

DT1057 - Expands the DT1050 vocabulary from 137 to over 260 words. Includes 2 ROMs and specs.
Part No. DT1057 .... $24.95 ea.

INTERSIL

Part No.	Pins	Function	Price
7045IPI	28	CMOS Precision Timer	14.95
7045EV/Kit	28	Stopwatch Chip, XTL (Evaluation Kit)	19.95
7106CPL	40	3½ Digit A/D (LCD Drive)	10.49
FE0203D		3½ Digit LCD Display for 7106 & 7116	14.95
7106EV/Kit	40	IC. Circuit Board, Display (Evaluation Kit)	46.95
7107CPL	40	3½ Digit A/D (LED Drive)	10.95
7107EV/Kit	40	IC. Circuit Board, Display (Evaluation Kit)	46.95
7116CPL	40	3½ Digit A/D LCD Dis. HLD	10.95
7201IUS		Low Battery Volt Indicator	2.25
7205IPG	24	CMOS LED Stopwatch/Timer	14.95
7205EV/Kit	24	Stopwatch Chip, XTL (Evaluation Kit)	16.95
7206CJPE	16	Tone Generator	4.95
7206CEV/Kit	16	Tone Generator Chip, XTL (Evaluation Kit)	7.95
7207AIPD	14	Oscillator Controller	5.95
7207AEV/Kit	14	Freq. Counter Chip, XTL (Evaluation Kit)	8.49
7215IPG	24	4 Func. CMOS Stopwatch CKT	16.95
7215EV/Kit	24	4 Func. Stopwatch Chip, XTL (Evaluation Kit)	19.49
7216AIJI	28	8 Digit Univ. Counter C.A.	31.49
7216DIPI	28	8 Digit Freq. Counter C.C.	21.49
7217IJI	28	4 Digit LED Up/Down Counter C.A.	10.95
7217AIPI	28	4 Digit LED Up/Down Counter C.C.	9.95
7224IPL	40	LCD 4½ Digit Up Counter DRI	10.95
7226AEV/Kit	40	5 Function Counter Chip, XTL (Evaluation Kit)	99.95

30009 1983 INTERSIL Data Book (1356 p.) **$9.95**

74HC High Speed CMOS

Part No.	Pins	Price
74HC00	14	.59
74HC02	14	.59
74HC03	14	.89
74HC04	14	.59
74HCU04	14	.69
74HC08	14	.59
74HC10	14	.59
74HC11	14	.69
74HC14	14	.89
74HC20	14	.59
74HC27	14	.59
74HC30	14	.69
74HC32	14	.79
74HC42	16	1.09
74HC51	14	.89
74HC58	14	.69
74HC73	14	.79
74HC74	14	.79
74HC75	16	.99
74HC76	16	.79
74HC85	16	1.69
74HC86	14	.75
74HC107	14	.79
74HC109	16	.79
74HC112	16	.79
74HC123	16	2.29
74HC125	14	1.75
74HC132	14	1.29
74HC137	16	1.59
74HC138	16	1.19

Part No.	Pins	Price
74HC139	16	1.05
74HC147	16	1.29
74HC151	16	.99
74HC153	16	1.09
74HC154	24	2.65
74HC157	16	.99
74HC158	16	.99
74HC160	16	1.39
74HC161	16	1.39
74HC162	16	1.39
74HC163	16	1.39
74HC164	14	1.35
74HC165	16	2.15
74HC166	16	2.49
74HC173	16	1.29
74HC174	16	1.09
74HC175	16	1.09
74HC190	16	1.59
74HC191	16	1.59
74HC192	16	1.49
74HC193	16	1.49
74HC194	16	1.19
74HC195	16	1.19
74HC221	16	2.95
74HC237	16	1.49
74HC240	20	2.29
74HC241	20	2.29
74HC242	14	2.15
74HC243	14	2.15
74HC244	20	2.29

Part No.	Pins	Price
74HC245	20	2.59
74HC251	16	.99
74HC253	16	1.09
74HC257	16	.99
74HC259	16	1.69
74HC266	14	.89
74HC273	20	2.79
74HC280	14	4.59
74HC299	20	5.59
74HC366	16	2.59
74HC367	16	2.59
74HC373	20	2.69
74HC374	20	2.69
74HC390	16	1.59
74HC393	14	1.59
74HC533	20	2.69
74HC534	20	2.69
74HC595	16	3.19
74HC688	20	3.59
74HC4024	14	1.75
74HC4040	16	1.49
74HC4060	16	1.49
74HC4075	14	.59
74HC4078	14	.59
74HC4511	16	1.95
74HC4514	24	4.19
74HC4538	16	2.59
74HC4543	16	3.75

74HCU04 is unbuffered.
All others are buffered.

74C—C/MOS

Part No.	Pins	Price
74C00	14	.29
74C02	14	.35
74C04	14	.35
74C08	14	.35
74C10	14	.35
74C14	14	.59
74C20	14	.35
74C30	14	.35
74C32	14	.39
74C42	16	1.19
74C48	16	1.79
74C73	14	.69
74C74	14	.59
74C85	16	1.39
74C86	14	.29
74C89	16	5.95
74C90	14	1.09
74C93	14	1.09
74C95	14	1.19

Part No.	Pins	Price
74C107	14	.79
74C151	16	2.19
74C154	24	3.25
74C157	16	1.75
74C160	16	1.19
74C161	16	1.19
74C162	16	1.19
74C163	16	1.19
74C164	14	1.29
74C165	16	1.29
74C173	16	.89
74C174	16	1.19
74C175	16	1.19
74C192	16	1.39
74C193	16	1.39
74C195	16	1.29
74C221	16	1.75

Part No.	Pins	Price
74C240	20	1.95
74C244	20	1.95
74C373	20	2.29
74C374	20	2.29
74C901	14	.59
74C902	14	.79
74C903	14	.59
74C906	14	.59
74C907	14	.89
74C911	28	8.95
74C912	28	8.95
74C915	18	1.19
74C917	28	8.95
74C922	18	4.49
74C923	20	4.95
74C925	16	5.95
74C926	18	5.95
80C95	16	.69
80C97	16	.69

LINEAR

Part No.	Pins	Price
TL071CP	8	.79
TL072CP	8	1.09
TL074CN	14	1.95
TL081CP	8	.59
TL082CP	8	1.19
TL084CN	14	1.95
LM109K		5.95
LM301CN	8	.39
LM302H		2.49
LM304H		1.95
LM305H		.99
LM307CN	8	.49
LM308CN	8	.69
LM309K		1.25
LM310CN	8	1.95
LM311CN	8	.59
LM312H		2.79
LM317T		1.19
LM317K		3.49
LM318CN	8	1.59
LM319N	14	1.49
LM320K-5		1.35
LM320K-12		1.35
LM320K-15		1.35
LM320K-24		1.35
LM320T-5		.85
LM320T-12		.85
LM320T-15		.85
LM320T-24		.85
LM322N	14	1.49
LM323K		4.95
LM324N	14	.59
LM329DZ		.65
LM331N	8	3.95
LM334Z		1.19
LM335Z		1.29
LM336Z		1.09
LM337MP		1.15
LM337T		1.89
LM338K		6.95
LM339N	14	.69
LM340K-5		1.35
LM340K-12		1.35
LM340K-15		1.35
LM340K-24		1.35
LM340T-5		.75
LM340T-12		.75
LM340T-15		.75
LM340T-24		.75
LF347N	14	1.49
LM348N	14	.89
LM350K		4.79
LF351N	8	.59
LF353N	8	.89

Part No.	Pins	Price
LF355N	8	1.09
LF356N	8	1.09
LM358N	8	.59
LM359N	14	1.79
LM370N	14	4.95
LM373N	14	4.95
LM377N	14	1.95
LM380CN	8	1.09
LM380N	14	.89
LM381N	14	1.79
LM382N	14	1.49
LM384N	14	1.95
LM386N-3	8	.89
LM387N	8	1.39
LM389N	18	1.19
LM391N-80	16	1.19
LM392N	8	.59
LM393N	8	.45
LF398N	8	3.95
LM399H		5.95
LF412CN	8	1.95
TL494CN	16	2.79
TL496CP	8	1.59
NE531V	8	1.79
NE544N	14	1.95
NE550A	14	1.95
NE555V	8	.35
XR-L555	8	.69
556N	14	.79
NE558N	16	1.59
NE564N	16	1.95
LM565N	14	.99
LM566CN	8	1.49
LM567V	8	.99
NE570N	16	2.95
NE571N	16	2.49
NE592N	14	1.19
LM703CN	8	1.49
LM710N	14	.69
LM711N	14	.79
LM723N	14	.49
LM733N	14	.89
LM739N	14	1.95
LM741CN	8	.39

Part No.	Pins	Price
LM747N	14	.69
LM748N	8	.59
UA760HC		9.95
LM1456V	8	1.95
LM1458CN	8	.59
LM1488N	14	.69
LM1489N	14	.69
LM1496N	14	.99
LM1605CK		9.95
LM1800N	16	2.49
LM1871N	18	2.95
LM1872N	18	3.25
LM1877N-9	14	2.95
LM1889N	18	1.95
LM1896N	14	1.59
LM2002T		1.95
ULN2003A	16	1.49
XR2206	16	3.95
XR2207	14	2.49
XR2208	16	1.79
XR2211	14	2.95
LM2877P		1.95
LM2878P		2.95
LM2901N	14	.79
LM2902N	14	.89
LM2907N	14	2.49
LM2917N	8	1.95
LM3900N	14	.59
LM3905CN	8	1.19
LM3909N	8	.89
LM3914N	18	2.39
LM3915N	18	2.39
LM3916N	18	2.39
RC4136N	14	1.25
RC4151NB	8	1.95
RC4195TK		5.95
LM4250CN	8	1.49
LM4500A	16	2.95
NE5532	8	1.69
NE5534	8	1.39
79M05AH		1.29
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LM13080N	8	1.19
LM13600N	16	1.19
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JE520AP

JE520CM

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JE520AP	For Apple II, II+, and *IIe*	$149.95

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Most of the popular Memory Boards (e.g. Quadram™ Expansion Boards) allow you to add an add'l. 64K, 128K, 192K or 256K. The IBM64K Kit will populate these boards in 64K byte increments. The Kit is simple to install – just insert the 9 - 64K RAM chips in the provided sockets and set the 2 groups of switches. Complete conversion documentation included.

IBM64K (Nine 200ns 64K RAMs). $43.95

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These PC compatibles and others use the IBM64K for memory expansion.

IBM64K (Nine 200ns 64K RAMs). $43.95

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Each Kit comes complete with eight MM5290 (UPD416/4116) 16K Dynamic RAMs and documentation for conversion. Model 1: 16K equipped with Expansion Interface can be expanded to 48K with 2 Kits. Model III: Can be expanded from 16K to 48K using 2 Kits. Each Kit will expand computer by 16K increments.

TRS-16K3 200ns (Model III). $8.95
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Easy to install Kit comes complete with 8 ea. 4164N-20 (200ns) 64K Dynamic RAMs & conversion documentation.

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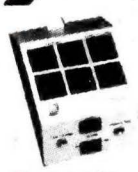

• Eliminates voltage spikes and EMI-RFI noise before it can damage your equipment or cause data loss • 6 month warranty • Power dissipation (100 microseconds): 1,000,000 watts • 6 sockets • 6 foot power cord • Normal line voltage indicator light • Brown out/black out reset switch

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Provides up to 30 minutes of continuous 120 VAC 60Hz power to your computer system (load dependent) when you have a black out or voltage sag • Six month warranty • Weight (PC200): 24 lbs. – (XT300): 37.5 lbs.

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PM-COM	(ProCom Communication Software). . . . . Please specify Operating System.	$79.95
PM-OP	(Options Processor).	$79.95
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PMO-32K	(Options Processor Memory – 32K).	$20.95
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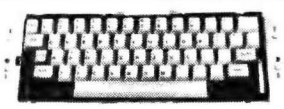
PM-CC	(Apple IIc to PM1200 Cable).	$29.95
PM-MC	(Macintosh to PM1200 Cable).	$29.95

KEYBOARDS



13⅛"L x 4¼"W x ¾"H

Mitsumi 54-Key Unencoded All-Purpose Keyboard

• SPST keyswitches • 20 pin ribbon cable connection • Low profile keys • Features: cursor controls, control, caps (lock), function, enter and shift keys • Color (keycaps): grey • Wt.: 1 lb. • Pinout included

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16-9/16"L x 6⅜"W x 1⅝"H

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• Simple serial interface • SPST mechanical switching • Operates in upper and lower case • Five user function keys: F1-F5 • Six finger edge card connection • Color (keys): tan • Weight: 2 lbs. • Data incl.

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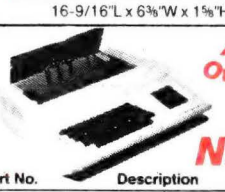

Apple Keyboard and Case for Apple II and II+

• Keyboard: Direct connection with 16-pin ribbon connector • 26 special functions • Size: 14½"L x 5½"W x 1½"H

• Case: Accommodates KB-A68 • Pop-up lid for easy access • Size: 15½"W x 18"D x 4¼"H

Part No.	Description	Price
KB-EA1	Keyboard and Case (pictured above).	$134.95
KB-A68	68-Key Apple Keyboard only.	$ 79.95
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TRANSACTION TECHNOLOGY, INC. 5VDC @ 1 AMP Regulated Power Supply

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Part No.	Output	Size	Weight	Price
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New!

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• Perfect for computer systems • Output: +5VDC @ 11 Amps, −5VDC @ 1 Amp, +12VDC @ 2 Amps, −12VDC @ 0.5 Amp and +24VDC @ 3 Amps • Overvoltage protection • Size: 12⅝"L x 6⅝"W x 4⅝"H • Weight: 17 lbs. • Spec incl.

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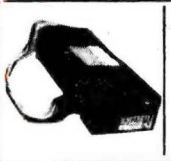
4-CHANNEL SWITCHING POWER SUPPLY

• Microprocessor, mini-computer, terminal, medical equipment and process control applications • Input: 90-130VAC, 47-440Hz • Output: +5VDC @ 5A, -5VDC @ 1 A; +12VDC @ 1A, -12VDC @ 1A • Line regulations: ±0.2% • Ripple: 30mV p-p • Load regulation: ±1% • Overcurrent protection • Adj: 5V main output ±10% • Size: 6⅜"L x 1⅞"W x 4-15/16"H • Weight: 1½ lbs.

FCS-604A. $69.95



Switching Power Supply for APPLE II, II+ & *IIe*™

• Can drive four floppy disk drives and up to eight expansion cards • Short circuit and overload protection • Fits inside Apple computer • Fully regulated +5V @ 5A, +12V @ 1.5A, -5V @ .5A, -12V @ .5A • Direct plug-in power cord included • Size: 9⅞"L x 3½"W x 2¼"H • Weight: 2 lbs.

KHP4007 (SPS-109). $59.95

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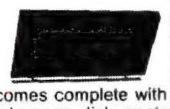
5¼" APPLE™ Direct Plug-In Compatible Disk Drive and Controller Card



The ADD-514 Disk Drive uses Shugart SA390 mechanics – 143K formatted storage • 35 tracks • Compatible with Apple Controller & ACC-1 Controller • The drive comes complete with connector and cable – just plug into your disk controller card • Size: 6"L x 3½"W x 8-9/16"D • Weight: 4½ lbs.

ADD-514 (Disk Drive). $169.95
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JE664-A EPROM Programmer. $995.00
Assembled & Tested (Includes JM16A Module)

JE665 – RS232C INTERFACE OPTION – The RS232C Interface Option implements computer access to the JE664's RAM. This allows the computer to manipulate, store and transfer EPROM data to and from the JE664. A sample program listing is supplied in MBASIC for CP/M computers. Documentation is provided to adapt the software to other computers with an RS232 port. 9600 Baud, 8-bit word, odd parity with 2 stop bits.

EPROM Programmer w/JE665 Option
JE664-ARS. $1195.00
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EPROM JUMPER MODULES – The JE664's JUMPER MODULE (Personality Module) is a plug-in Module that pre-sets the JE664 for the proper programming pulses to the EPROM and configures the EPROM socket connections for that particular EPROM.

JE664 EPROM Jumper Mod. No.	EPROM	Programming Voltage	EPROM MANUFACTURER	PRICE
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JM16B	TMS2716 (3-V's)	-5V, +5V, +12V	Motorola, TI	$14.95
JM32A	TMS2532	25V	Motorola, TI, Hitachi, OKI	$14.95
JM32B	2732	25V	AMD, Fujitsu, NEC, Hitachi, Intel, Mitsubishi, National	$14.95
JM32C	2732A	21V	Fujitsu, Intel	$14.95
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JM64C	TMS2564	25V	TI	$14.95

Navarone Announces Four New Programs For The TI-99/4A

Navarone Industries, the largest independent publisher of TI-99/4A software in the United States, is pleased to announce the immediate release of four new cartridge programs for the TI-99/4A home computer. In keeping with its commitment to support the TI aftermarket with a full-line of quality software for the TI-99/4A computer user, the four new products expand the home application, home education and home business categories.

Data Base Management System - The most powerful Data Base Management programs available for the TI-99/4A home computer. This system is written entirely in Assembly language in order to exercise the full power of the 16-bit computer. You can create data bases with up to 35 fields in 32000 records. (Record size is limited to 255 bytes.)

The Navarone Data Base Management system is ideal for the "Home Business" to keep track of inventory, customer files, or even send personalized form letters. The Entry module lets you set up your own screen input, then provides file maintenance functions such as display, add, change and delete records. A powerful disk sort module is used to sort data base files with up to 6 nested sort keys. By using assembly language and high speed sort algorithms, this module can sort virtually unlimited file sizes at disk speeds. A special Select code feature allows sorting only selected records. The Report module generates custom reports with the ease of playing a game. Special screen editing features provide a full 80 col. display in which to create fields and move them freely to position your data text in the precise location. Column totals and subtotal breaks are a snap. This software is truly a dream come true for TI owners at just $69.00.

Homework Helper+ - Makes homework fun while developing basic computer skills. This new educational program for children 8 years and older, features a built-in 20,500 word spelling checker dictionary to identify spelling errors. Homework Helper is a simple-to-use tool for improving study habits, written work quality, and planning class assignments. Homework Helper contains a word processor which includes standard format for book reports and class projects. This software makes good use of the peripheral expansion features of the computer for $49.95.

Speed Reading - Improves reading speed and comprehension. Versions are available for children and adults. This program comes complete in a cartridge, no addition peripherals or memory is required, however, special features can be used if a disk drive is available. The program provides extensive practice in taking in more print faster. A complete workbook is included with the cartridge for $49.95.

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Further information can be obtained by writing to Navarone Industries, Inc., 510 Lawrence Expressway #800, Sunnyvale, CA 94086.

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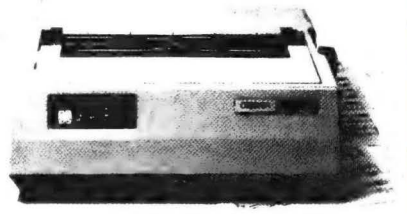

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MacProject is shipping and is available now from authorized Apple dealers. It has a suggested retail price of $125.

For further information contact Apple Computer, Inc., 20525 Mariani Avenue, Cupertino, CA 95014. (408) 996-1010. TLX 171576 TWX 9103382054.

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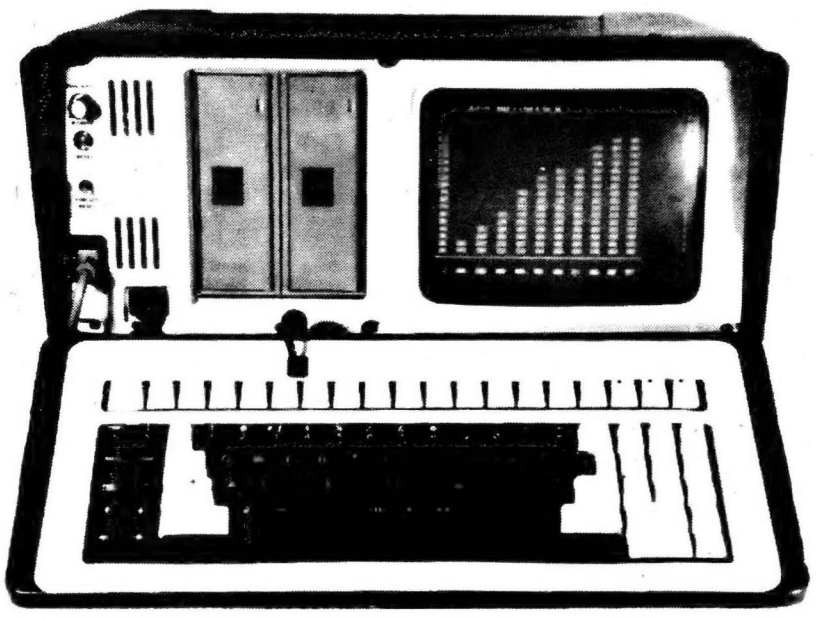

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• CPM 2.2 OPERATING SYSTEM INCLUDING UTILITIES • M80 (INCLUDING L80, LIB80, CREF80) • SOURCE CODE OF THE BIOS PLUS ANY OTHER MODULAR SUPPLIED UTILITIES • DATA COMMUNICATION SETUP PACKAGE

General Specifications

ZORBA is the lowest cost full featured portable computer. This light weight computer is ruggedly packaged in a convenient weather sealed carrying case. The case surrounds a strong inner chassis which further protects the Z80A based computer with its two double sided double density disk drives, large easy to read display screen and well designed detachable keyboard.

ZORBA uses CP/M, the industry standard operating system, which means that a wide range of existing software is readily available to the user.

ZORBA has a full set of I/O Ports. (Reference Interfaces)

ZORBA supplies a SETUP program to configure these software programmable ports for message format, transmission protocol, data translation and baud rate.

The ZORBA users manual and technical manual covers operation of the unit, all supplied software and all interface and internal information. A system diskette is supplied with all system files and utilities. A second diskette contains the sources for all ZORBA software including BIOS, SETUP, FORMAT, and PATCH.

Keyboard

Keyboard communicates serially with CPU
Detachable with 2 foot coiled cord
95 keys in standard QWERTY format
13 Key Numeric pad
Independent Caps Lock and Shift Lock
55 Software programmable function keys
All keys auto-repeat after 1 second delay
All Standard cursor and terminal control keys

Disk System

Controller:	WDI1793
Drives:	5.25 Double Sided, Double Density, 48 TPI
Tracks:	40
Sectors/Cylinder:	20 Double Side
Bytes/Sector:	512 Double Density
Capacity/Diskette:	409,600 bytes
Seek Time:	2 ms track to track (nom.), 15 ms settling time
Head Load:	0 ms
Motor Timing:	200 ms startup, 10 seconds autostop timeout
Rotation:	300 rpm
Recording:	FM Single Density
Standard:	MFM Double Density

Built-in disk interchange formats: Xerox 820 (SD, DD), Kaycomp (DD), DEC VT-180 (SD), Osborne (SD) and IBM-PC (eg. CPM/86) and Televideo 802 (Read/Write and Format compatibility)

Specifications General Mechanical and Electrical

Width	-17.5 inches (44.45 cm)
Height	- 9.0 inches (22.86 cm)
Depth	-16.0 inches (40.64 cm)
Weight	-24.6 pounds (11.1 Kg)
Power	-80-130 VAC or 190-245 VAC 50/60 Hz 170 watts max

Operating Environment:

Ambient Temperature: 0-50 degrees Celsius
Relative Humidity: to 95%-Non-Condensing
Cooling: Forced Air

Display

Display Tube:
9'' diagonal with Green or Amber
High resolution display circuitry
Nonglare flat face screen
60 Hz refresh rate

Display Format:
25 lines x 80 columns
5x7 Character Font with full descenders
128 ASCII Characters
8x9 32 Characters Graphic Font
2K Memory Mapped Display Buffer

CPU Board

Z80A CPU running at 4 Mhz with no wait states
64K bytes of [illegible] ns RAM (58K after CP/M loaded)
16K bytes of [illegible]OM (2732) can be switched in and out by software
12K available for user EPROMS
8275 CRT controller, DMA driven
1793 Floppy disk controller, SMC data separator
Bipolar proms configure 10 addresses
Fully structured interrupts prioritized by bipolar proms

Interfaces

- Full asynchronous RS232 port with modem control. Baud rates and data translation and protocol programmable
- Full asynchronous full duplex RS232 port with hardware handshake (for printers). Baud rates and protocol programmable.
- Keyboard Serial Interface-5V TTL assigned at 1200 bits per second programmable
- One 8 Bit parallel port with independent strobe and ready lines. Supports Centronics interface with an available adaptor cable.
- IEEE 488 Bus Master Port (ie: General Purpose Instrumentation Bus) not Software Supported.
- 21 Standard Software Programmable Baud Rates including: 45.5, 50, 62.5, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1760, 1800, 2000, 2400, 3520, 3600, 4800, 7200, 9600, 19200 BPS.

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APPLE

CAT #		LIST	SALE
0080	Adam & Eve Paddles	39.95	27.50
1298	Adventure Writer	70.00	53.85
0560	Algebra I	39.95	27.60
0723	Algebra V & VI (2-Disk)	49.95	34.50
1142	Alien Addition (Home)	34.00	23.55
0013	Alpha Plot	39.50	27.25
2598	Alphabet Zoo	29.95	20.70
0434	Apple Cat 2 Modem	319.00	244.95
0151	Apple Mechanic	29.50	20.35
0490	Apple Users Guide 2/2E	17.95	14.50
1580	Applesoft Compiler Plus	59.95	41.50
0309	Applewriter 2 Pre-Boot	24.00	16.95
0536	Assembly Lines (Book)	19.95	15.35
2905	Axis Assasin	35.00	26.95
1446	Back to Basics Acct. 2E	195.00	123.75
0042	Bag of Tricks	39.95	27.65
0501	Bank Street Writer	69.95	48.35
1204	Bank St. Writer 2C/E-128K	69.95	48.35
0211	Barron's Computer Sat	89.95	62.30
0277	Battle For Normandy	39.95	27.65
0278	Beagle Bag	29.50	20.35
0126	Beagle Basic	34.95	24.20
1192	Beagle Graphics	59.95	41.50
0658	Beneath Apple DOS	19.95	13.85
1395	Beneath Apple Prodos	19.95	14.95
1136	Beyond Castle Wolfenstein	34.95	24.20
0111	Book of Apple Software '85	24.95	16.00
0096	Bookends	125.00	86.40
2599	Broadsides	39.95	27.70
1682	Buffered Grappler+ (16K)	239.00	178.00
0448	Bumble Games	39.95	27.65
2805	Business Accountant 2/2E	255.00	196.15
0228	Castle Wolfenstein	29.95	20.70
0459	Cat Graphics	34.95	26.65
0734	CDEX How to Use Apple IIE	59.95	41.50
0733	CDEX Visicalc Training	59.95	41.50
1417	Charles Brown's ABC's	39.95	27.65
0386	Chess	69.95	48.35
2612	Chivalry	49.95	34.60
1432	Codewriter	200.00	141.05
0740	Compu-Math/Arith. Skills	49.95	34.50
0654	Compu-Read	29.95	20.70
0734	Compu-Spell System	29.95	20.70
0416	Compuserve Starter Kit	39.95	24.35
1138	Computer Sat (Harcourt)	79.95	62.85
1731	Copy 2 Plus	39.95	25.65
2910	Cut & Paste	50.00	38.50
1265	DB Master Version 4	350.00	242.35
0052	Deadline	49.95	34.50
0189	Decathalon	29.95	20.70
0630	Delta Drawing	39.95	27.65
1143	Demolition Division (Home)	34.00	23.55
1166	Disk Bank (50)	19.95	11.00
1722	Disk Boxes (5 Color Coded)	25.00	12.50
2866	Disk Drive Ext. Cable	19.75	16.70
2833	Disk Quik	29.50	20.45
1205	Dollars & Sense-2C	119.95	83.05
0409	Dollars & Sense	100.00	69.25
0216	DOS Boss	24.00	16.60
0983	Double Take	34.95	24.15
2600	Eagles	39.95	27.70
0360	Early Games Young Children	29.95	20.75
1384	Echo 2 Speech Synthesizer	149.95	125.60
0661	Elementary Apple	14.95	10.35
0092	Elephant Disks SS/DD (10)	20.55	18.20
1137	Elephant Disks SS/SD (10)	34.00	17.95
0107	Epson Mx-80 Ribbon	14.00	6.30
0029	Essential Data Duplicator	79.95	52.00
0314	EZ Port II	34.95	24.20

CAT #		LIST	SALE
0280	Facemaker	34.95	24.20
1182	Fat Cat	34.95	24.20
0850	Flashcalc	99.00	68.55
0553	Flex Text	29.50	20.35
2821	Flight Simulator II	49.95	38.05
2918	Flip & File W/Lock (50)	39.95	23.85
1440	Flip-N-File (50 Disks)	19.95	11.30
2796	Fontrix	75.00	64.10
1427	Format II Enhanced	150.00	103.85
0554	Frame-Up	29.50	20.35
1127	Game Show	39.95	27.65
0046	General Manager II	229.95	158.90
0533	Geopolitique 1990	39.95	27.65
0573	Gertrude's Puzzles	44.95	31.15
2843	Global PLE/Beagle Bros	49.95	34.60
0043	Graphics Magician	59.95	41.40
0094	Grappler +	175.00	110.80
2902	Hardhat Mac	35.00	26.95
2816	Hayes Joystick Mach 2	44.95	31.15
2817	Hayes Joystick Mach 2-E	44.95	31.15
2883	Hayes Joystick Mach 3	54.95	38.05
2880	Hayes Joystick Mach 3-E	54.95	38.05
1437	Head Cleaning Kit	29.95	17.30
0197	Home Accountant	74.95	48.05
1364	Home Accounant 2C/E-128K	74.95	48.05
2804	Home Word	69.95	48.60
1684	Home To Pgrm. In Applesoft	49.95	34.60
1589	In Search Of Amazing Thing	39.95	27.60
0449	Juggles Rainbow	29.95	20.75
1442	Kindercomp	29.95	20.70
0003	Knight Of Diamonds	34.95	24.20
1693	Koala Graph Tablet-Apple	124.95	83.50
2954	Krell Logo	89.95	76.95
2972	Labels - 1" White (1000)	9.95	6.75
2890	Learning Bridge Made Easy	79.95	53.35
1463	Legacy of Llylgamyn	39.95	27.65
0050	Letter Perfect	149.95	103.60
0403	Lisa 2.6	79.95	61.75
0310	List Handler	79.95	53.35
0806	Locksmith 5.0	99.95	71.55
0982	Lode Runner	34.95	24.15
0194	Magic Window 2	150.00	103.85
0192	Master Type	39.95	27.65
0089	Maxell MD1 Disk-SS/DD (10)	46.50	21.55
2901	Memorymaster 2E/64K Exp.	169.00	140.85
2147	Micro Cook-Appetizers-2E	12.00	8.50
2146	Micro Cook-Soups/Salads-2E	12.00	8.50
0437	Micro Cookbook	40.00	27.65
2148	Micro Cookbook IIE	40.00	27.65
0692	Microline 92-P Printer	599.00	CALL
1509	Microline Ribbon	3.20	2.20
2958	Microline Tractor Feed	65.00	54.00
2802	Micromodem IIE W/Smartcom I	329.00	246.75
1294	Micro-Sci 2C Disk Drive	299.00	248.75
1316	Micro-Sci A2 Disk Drive	345.00	237.15
1347	Millionaire	59.95	41.50
1135	Minus Mission (Home)	34.00	23.55
1124	Mockingboard	129.00	105.50
0774	Mockinboard with Speech	195.00	162.50
1400	Moptown Hotel	39.95	27.65
0580	Multiplan (Apple DOS)	195.00	135.00
1341	Murder on the Zinderneuf	40.00	30.75
2903	Music Const. Set	40.00	30.75
0101	NEC 1215 Color Monitor	399.00	333.35
0273	NEC 8023 Ribbon	10.00	6.65
0423	Nibble's Away II	69.95	53.25
2908	One On One	40.00	30.75
1531	Orca/M	149.95	103.80
0563	Paddle-Adapple Combo	29.95	26.90
0568	Paper Graphics	49.95	34.60
2893	Paral' Printer Ext. Cable 6'	34.95	21.80
0635	Parallel Interface W/Cable	139.50	62.85
1418	Peanuts Picture Puzzlers	39.95	27.65
0616	Personal Touch	89.00	70.55
0088	PFS Access-2E/2C	70.00	48.50
1413	PFS File IIE	125.00	85.95
1415	PFS Graph IIE	125.00	85.95
1414	PFS Report IIE	125.00	85.95
0372	PFS Solutions/Ledger 2E	20.00	13.85
2809	PFS Write IIE	125.00	85.95
0495	Pie Writer 2.2 (40/80)	149.95	103.85
2907	Pinball Const. Set. (E.A.)	40.00	30.75
0659	Power of Visicalc	14.95	10.35
0584	Preschool IQ Builder 1	23.95	16.60
1196	Printshop	49.95	34.60
0349	Pro Blackjack — K. Uston	69.95	48.45
0461	Pronto DOS	29.95	20.35
1279	Prowriter Nylon Ribbon	10.00	6.65
0047	Quest	34.95	24.20
2111	Ramcard 16K (MPC)	99.00	60.25
0634	Ramcard 16K Microtek	129.00	71.55
0955	Ramcard 16K Prometheus	99.00	56.55
1386	Ramcard 16K Wizard	95.00	62.85
0140	Ramcard 16K-Microsoft	99.95	75.00
0771	RF Modulator-Internal	39.00	19.40
1450	Rhymes & Riddles	29.95	20.70
0503	Riteman Pl's Printer	399.00	312.80
0574	Rocky's Boots	49.95	34.60
0561	Sat Word Attack Skills	49.00	33.90
0133	Screenwriter II	129.95	89.00
0041	Sensible Speller IV	125.00	86.50

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1206	Sensible Speller-Pro DOS	25.00	86.50
0447	Sideways	60.00	40.00
0400	Silicon Salad	24.95	17.25
1340	Sky Fox	40.00	30.75
1373	Smartmodem 2C W/Smartcom I	399.00	265.60
1416	Smith Corona TP1 Ribbon	7.95	6.35
0465	Snooper Troops I	44.95	31.15
0271	Software Automouth	124.95	86.35
0250	Spellagraph	39.95	27.65
1291	Spellicopter	39.95	27.65
0631	Spelling Bee Games	39.95	27.70
2906	Standing Stones	40.00	30.75
1277	Starwriter Film Ribbon	5.50	4.50
0435	Step-By-Step	99.95	69.20
1447	Step-By-Step II	99.95	69.20
0100	Sticky Bear A B C	39.95	27.65
0099	Sticky Bear Numbers	39.95	27.65
0292	Story Machine	34.95	24.20
1326	Sundog	40.00	30.75
1374	Sup'r Mod — Universal	69.95	53.05
1445	Supertext Pro (40/80)	99.00	68.55
0524	Switch-A-Slot	179.50	161.10
0001	System Saver	89.95	69.20
1259	Taxan 12 in Amber Monitor	189.00	138.65
1258	Taxan 12 in Green Monitor	179.00	131.60
1528	Taxan Color Mntr. W/Audio	399.00	305.50
0236	Terrapin Logo	99.95	69.20
0137	TG Game Paddles	39.95	27.65
0136	TG Joystick W/Toggle	59.95	41.50
1330	TG Joystick W/Toggle IIE	64.95	45.00
1730	The Accountant	99.00	64.10
2597	The Accountant — V Calc. Infc.	20.00	15.40
0844	Think Tank/E	150.00	103.85
2897	Thunderclock Plus	150.00	121.80
2899	Time Master II	129.00	107.50
0462	Tip Disk #1	20.00	13.85
1193	Triple Dump	39.95	27.65
0544	Typefaces	20.00	13.85
0155	Typing Tutor 2	24.95	17.30
1237	Typing Tutor 3	49.95	34.60
2836	Ultima 3 (Exodus)	54.95	40.00
0559	Ultraterm	379.00	284.30
0062	Utility City	29.50	20.35
2992	Verbatim DS/DD (10)	46.50	25.90
1721	Verbatim SS/DD Hardpack	35.00	23.35
0093	Verbatim SS/DD Softpack	34.00	18.00
0063	Versaform	389.00	263.00
0648	Videoterm W/SS & Inverse	319.00	247.05
2900	Viewmaster 80 Column	169.00	140.80
2152	Visible Computer-6502	49.95	32.70
0422	Visicalc Pre-Boot	49.00	33.95
1480	Wico Analog-Joystick	49.95	38.40
0145	Wizard & Princess	32.95	22.75
0144	Wizardry	49.95	34.60
1532	Wizprint	24.95	17.30
0284	Word Handlers Pkg.	169.95	117.65
1223	Word Juggler/C	189.90	157.50
0342	Word Juggler IIE W/Leixcheck	189.00	157.50
1336	Z Engine With CP/M 2.2	199.00	166.65
0249	Z-80 Plus Board	139.00	115.85
0521	Zaxxon	39.95	27.60
0296	Zork I	39.95	27.60
0141	Zork II	44.95	29.95
0379	Zork III	44.95	29.95

MACINTOSH

0656	Chart (MAC)	125.00	86.55
0523	Da Vinci — Building	49.95	34.60
1151	Dollars & Sense	149.95	103.80
1362	Financial Cookbook	50.00	38.50
1082	Graphics Magician	49.95	34.60
1388	Habadex	199.00	134.70
1099	Helix	395.00	273.45
1083	Home Accountant	99.95	64.10
1357	Mac Tool	39.95	25.65
1207	Main Street Filer	249.95	173.05
1322	Megafiler	195.00	132.00
2787	Memorex 3.5-In Disks (10)	60.00	44.40
0627	Microsoft Basic (MAC)	150.00	103.85
0655	Multiplan (MAC)	195.00	135.00
0076	Murder by the Dozen	34.95	24.20
1078	PTS File	125.00	85.95
1077	PFS Report	125.00	85.95
1363	Pinball Construction Set	40.00	30.75
0869	Sales Edge	250.00	166.70
1244	Sargon III	49.95	34.60
1239	Typing Tutor 3	49.95	34.60

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COMMODORE

CAT #		LIST	SALE
2741	Acct Pay Mgmt/Checks D	59.95	41.50
1443	Adventure Writer (D)	60.00	42.35
0064	Alien Addition D	34.00	23.55
0335	Alligator Mix D	34.00	23.55
2713	Alphabet Zoo D	29.95	20.75
2714	Alphabet Zoo R	34.95	24.20
2913	Archon D	40.00	30.75
1342	Archon II — Adept (D)	40.00	30.75
2914	Axis Assasin D	35.00	26.95
1750	B-1 Nuclear Bomber C	16.00	11.10
1764	Bank Street Writer D	69.95	48.35
1512	BASF Disks SS/DD (10)	35.00	19.00
1424	Basic Grammar I (D)	34.95	26.90
1355	B.I.-80/80 Column Display	208.00	160.25
0820	Barron's Study for SAT (D)	89.95	62.30
2667	BC's Quest For Tires D	34.95	24.20
0262	Beachhead D	34.95	26.00
0087	Beyond Castle Wolfen (D)	34.95	24.20
0358	Boulder Dash (D)	34.95	25.55
2873	Calc Result-Easy R	79.95	55.35
1167	Canada A/M (D)	39.95	32.45
2959	Cardco Cardprint/+G	109.95	83.75
2835	Castle Wolfenstein D	29.95	20.70
1395	Challenge Math 11 (D)	34.95	26.90
2702	Checkers D	49.95	34.60
2701	Chess D	69.95	48.45
1761	Choplifter R	44.95	31.05
1154	Codewriter (D)	99.95	76.95
2223	Combat Leader (D)	39.95	27.65
0443	Comm 64 User Encylcopedia	14.95	10.50
0416	Compuserve Starter Kit	39.95	24.35
2337	Computer Sat D-Harcourt	79.95	62.85
2885	Congo Bongo R	39.95	27.65
2917	Cut & Paste D	50.00	38.50
1080	Dallas Quest (D)	34.95	25.55
1765	David's Midnight Magic D	34.95	24.15
1880	Deadline D	49.95	34.60
2204	Death In The Caribbean D	35.00	24.25
2716	Delta Drawing R	39.95	27.65
0103	Demolition Division D	34.00	23.55
1893	Dino Eggs D	40.00	27.70
1722	Disk Boxes (5 Color Coded)	25.00	12.50
2984	Disk Boxes — Individual	5.00	2.50
2158	Diskey D	49.95	34.60
2254	Doodle D	49.95	30.75
2179	Dragonriders Of Pern D	40.00	27.70
2320	Dust Cover - 1541 Disk Drv	7.99	5.30
2321	Dust Cover - Commodore 64	7.99	5.30
2340	Early Games Children D	29.95	20.75
2674	Early Games Fractions D	29.95	20.75
2677	Early Games Matchmaker D	29.95	20.75
2672	Early Games Music D	29.95	20.75
2670	Early Games Piece Cake D	29.95	20.75
0546	Elementary Commodore	14.95	11.50
0092	Elephant Disks SS/DD (10)	37.00	18.20
1337	Elephant Disks SS/SD (10)	34.00	17.95
0107	Epson MX-80 Ribbon	14.00	6.30
2215	Facemaker R	34.95	24.20
2973	Flight Simulator 2 D	49.95	38.05
2918	Flip & File W/Lock (50)	39.95	23.85
1440	Flip-N-File (50 Disks)	19.95	11.30
2136	Floyd Of The Jungle D	29.95	23.05
1950	Fort Apocalypse D	34.95	24.20
1905	Frogger D	34.95	24.15
1260	Fuji SS/DD Disks (10)	46.00	19.25
1811	Games Commodore 64 Play	14.95	10.35
2183	Gateway To Asphalt R	40.00	27.70
2739	General Ledger D	59.95	41.50
0905	Geopolitique D	39.95	27.65
2815	Getting Most From Your C64	14.95	12.85
1098	Graphic Basic (D)	29.95	21.90
1847	Gridrunner R	29.95	20.70
2911	Hardhat Mac D	35.00	26.95
1437	Head Cleaning Kit	29.95	17.30
2137	Hellcat Ace D	29.95	23.05
0334	Hesmodem 2 (D)	119.97	97.40
1936	Hey Diddle Diddle D	29.95	20.70
1782	Home Accountant D	74.95	48.05
2297	Homeword D	69.95	48.30
2789	How To Use Commodore 64	3.95	3.30
2868	In Search Of/Amazing D	39.95	27.65
2953	Infidel (D)	39.95	26.65
1839	Jumpman D	40.00	27.70
1320	Kids And The Commodore 64	19.95	15.05
2712	Kids On Keys D	29.95	20.75
2218	Kids On Keys R	34.95	24.20
2315	Kidwriter D	34.95	24.20
2214	Kindercomp D	29.95	20.70
2216	Kindercomp R	29.95	20.70
2222	Knights Of The Desert D	39.95	27.65
1333	Koala Graphic Table-CMD64	99.95	75.00
1883	Kraft Joystick (At Type)	16.95	13.45
0633	Kwik-Load (D)	19.95	13.85
2972	Labels - 1" White (1000)	9.95	6.75
0828	Learning Bridge-Goren (D)	79.95	55.35
2989	Lode Runner D	34.95	24.20
2855	Lode Runner R	39.95	27.70
1343	Mail Order Monsters (D)	35.00	26.95
1886	Master Type D	39.95	27.65
2970	Math Blaster D	49.95	34.60
0089	Maxell MD1 Disks-SS/DD (10)	46.50	21.55
0692	Microline 92-P Printer	599.00	CALL
1509	Microline Ribbon	3.20	2.20
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Assembly Language Programming

For The Apple II

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Operand Arithmetic

One very interesting and very heavy feature of ADASM is that you can do simple arithmetic on operands.

For instance, you can do a STA PLACE + 1; or a LDA ADDRESS/256; or a STA OLDFLE + FLNGTH; or an ORG START + $0200 or a STY BASE + POINTER*2...

> You can do arithmetic as part of an operand with EDASM.
>
> This lets you calculate an address or value. The calculation may be either absolute or relative.
>
> You can add, subtract, multiply, or divide, using the usual +, −, *, and / symbols. Use no spaces.

This gets very convenient for skipping part of memory when you assemble a new part of a program, for picking two parts of an address pair, for doubling a pointer value, and for other sneaky things.

There are some use rules and restrictions to operand arithmetic. You must use only the digits from 0 to 65535 or hex $0000 to $FFFF, or labels equated to values in this range. If you are working with 8-bit values, you have to be sure you get an 8-bit result. On 16-bit values, the answer will wrap-around, giving you a 16-bit result.

And, you are not allowed to have any spaces in the math expression. Anything beyond a space is usually treated as a comment.

So...

> If you use operand arithmetic, be sure to have no spaces in the expression.
>
> Also, be sure that you get an 8-bit result when you need one.

The best way to work with operand arithmetic is on a "try-it-and-see" basis. If it works, fine. If not, you'll get an error message that may suggest a better approach.

Operand arithmetic is a sophisticated tool for the advanced programmer. You don't have to use it at all if you don't want to. But operand math sure does neat things when you really get into it. We will see some examples later.

Logic functions are also allowed in "new" EDASM, using " " for AND, " " for OR, and "!" for EXCLUSIVE OR.

More on Pseudo-Ops

We have seen that two different beasties can go in the op code column. We can use "real" op codes that are to be assembled into 6502 machine language code. And we can use "fake" op codes that deliver a message to the assembler, making it change what it is doing...

> A pseudo-op delivers a message to the assembler during the assembly.

Thus, pseudo-ops are used to control the assembler, while real op codes are used by the assembler to generate final 6502 machine language object code.

When you write a source code line, you have a choice of making that line a pure comment, of giving a real op code that you want to assemble into a machine language program, or of sending a special message to the assembler for use during the assembly process.

What you put where is up to you. This will become more obvious as we go on.

In this book, we will classify the EDASM pseudo-ops into four groups. Further, if the pseudo-op is very "important" or is very often used, you will see it described in a separate section. There are lots of pseudo-ops that you won't have to worry about too much until well after you have some assembler experience. We will call these "also rans," and we will just summarize them for now. Feel free to tear into the EDASM assembler manual for more details on these.

Let's call our pseudo-op groups the pretty printing group, the structure group, the file group, and finally, the conditional group....

> **TYPES OF PSEUDO-OPS**
>
> The PRETTY PRINTING pseudo-ops make the final assembler easier to read and understand.
>
> The STRUCTURE pseudo-ops decide where our program is to start, isolate file blocks, and chain listings together.
>
> The FILE pseudo-ops help you enter data values into a file.
>
> The CONDITIONAL pseudo-ops give you a way to assemble logically selected parts of a complete listing.

Let's start with the pretty printers..

Pretty Printers

Our pretty printing pseudo-ops make the assembler listing easier to read and easier to use.

So many assembly language listings look so awful because the people doing them are either lazy or else afraid to "waste" some source code space on commands that make the assembly listing much more attractive and far easier to read. As we'll find out later, well over one half of your source code should be devoted to user comments and to pseudo-op commands that make the listing pleasant and readable.

SKP

We will start with a very simple pseudo-op. SKP stands for skip and lets you skip as many vertical spaces as you want to on your assembler printout. For instance, SKP 1 will give you one blank line. SKP 6 will give you a white space six blank lines high on the printout.

You use SKP to put white space into the printout. This lets you separate sections, makes titles more attractive, and generally cleans up the presentation. Remember that a blank source code line is a no-no. So, if you want a blank line, use SKP 1 instead. This is sort of like some military documents with their "This page intentionally left blank" message on them, but that's the way it is.

One use rule. Be sure to leave a space between SKP and the number. It's SKP 5, not SKP5.

PAGE

The PAGE pseudo-op does a form feed for you. A form feed automatically moves you to the top of the next page. Use this one to put the listing breaks where you want them and to isolate separate parts of a program, such as the title block, the hooks, the main program, the subs, and the files from each other.

The "old" version of EDASM has a bug that sometimes messes up headers if it is allowed to do its own page breaks. So, it is always a good idea to force PAGE commands when and where you want them.

Continued on page 81

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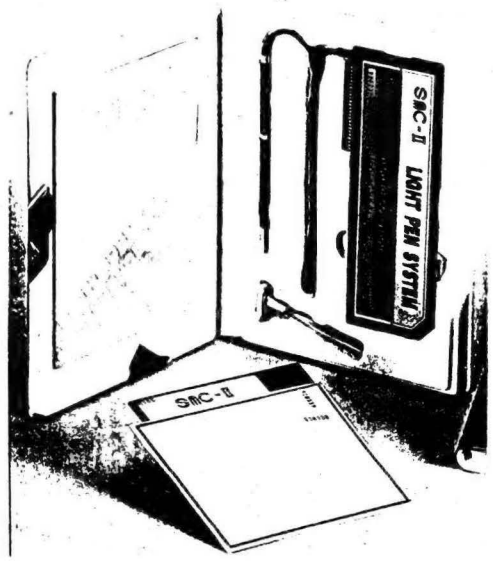

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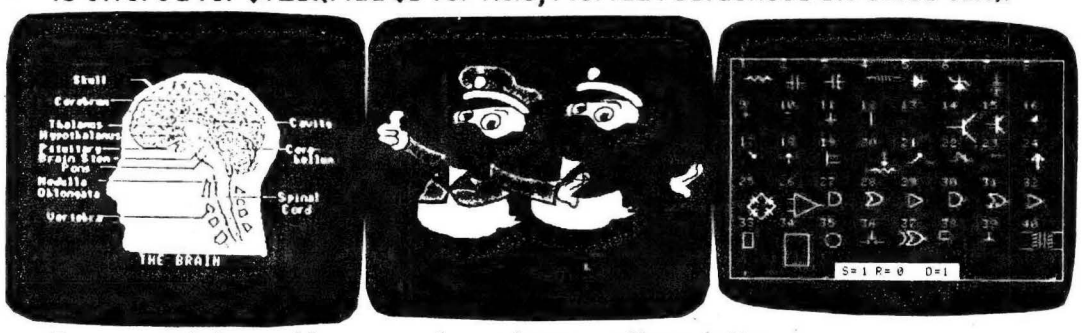

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SBTL

The SBTL pseudo-op will print out a subtitle for you at the top of each page and will automatically number the pages for you with a page number, a version number, and the name of the programmer. The SBTL command reads a disk file called the ASMIDSTAMP, short for "assembler identity stamp." You are prompted when you first boot EDASM to update this header.

It is a very good idea to always use this SBTL pseudo-op as the first line in your source code file. If you do not use SBTL, you will get no headings and no page numbers.

LST OFF

This pseudo-op says to turn the listing off. You do this if you don't want to have the entire assembly process appear on your printed record. If you are reassembling only a small part of your entire program, you put a LST OFF at the beginning, and then the LST ON command at the start of where you want a printed record.

I do not recommend using LST OFF this way, since you don't always have a complete update of the last version of your assembly source code. Leave the listing on during assembly.

One handy use of LST OFF, though, is to put this at the end of your program, after you have gone through it a time or two. This stops the printing of the long label lists at the end of your program and speeds things up considerably.

LST ON

This is the opposite of LST OFF and turns the printer back on when you get to a point in the program when you want to start listing again. EDASM automatically comes up with the listing on, should you give it the proper print command.

On "new" EDASM, many different listing features can be individually switched on or off.

Also RANS—

There are two older, lesser pretty printing pseudo-ops. These are REP for repeat and CHR for character. Together these two let you print a continuous line of stars or whatever.

It is simpler and easier just to use comments for the same thing although using REP and CHR does save a negligible amount of source code disk space. These commands are not needed at all if you are creating your source code the "new way" with a word processor. The auto-repeat on the Apple IIe completely elminates the need for either of these.

Structure Pseudo-Ops

There are three very important pseudo-ops used to structure your source code, along with seven lesser ones.

ORG

The ORG pseudo-op tells us where we are to start addressing our object code program. Every normal machine language program needs a starting point, and your source code file must tell the assembler where to start. This must be done before the assembly into machine language can begin.

For instance, an ORG $0800 early in your source code will tell the assembler to start assembling at $0800.

We'll see later why you usually put the origin on the third line of your source file. You must put it before any real op codes.

You can also use ORG later in your program to reposition a new part of your code. Say you want your subroutines to begin on the page above your main program. You can use an "ORG START + $0100" command to do this. The "ORG START + $0100" tells the assembler, "Forget about where we are assembling. Instead, start assembling what follows at the address START + $0100." Note that this operand does a 16-bit address calculation. For this to work, you must have a label of START on your first "real" program line.

Now, if your main program was longer than a single page, you would use START + $0200 or START + $0B00, or whatever you wanted.

ORG can also be used to generate several different object codes from a single source code file. More on this later.

EQU

The pseudo-op EQU stands for equate, and is used to first establish the meaning of a label or a page zero address, an absolute address, or a 16-bit value. You must be very careful to use 8-bit values for 8-bit equates and 16-bit values for 16-bit equates...

```
Use 8-bit values for 8-bit EQUs.
Use 16-bit values for 16-bit EQUs.
DON'T MIX THEM UP!
```

All the EQUs should go ahead of the real op codes so that all labels are defined before they are used.

For instance, a line of...

```
43 SPKR     EQU  $C030     ; WHAP SPEAKER
```

....will define the label SPKR as having an address of $C030. Any time later in the program that you want to whap the speaker, you just use SPKR as an operand.

```
27 BASL     EQU  $28       ; SCREEN BASE ADDRESS LOW
```

Note the separate fields above in our source code line. The number field tells us we are on line 43. The SPKR in the label field defines this label for us. Since we have defined this label here, we are now free to use SPKR as an operand as often as we want to later in the program. The EQU in the op code field tells us we are using a pseudo-op that instructs the assembler to do something, rather than a "real" op code that would get assembled into object code. EQU means "equate," so SPKR will get equated to whatever is in the operand field.

The operand field has a $C030 in it, meaning that we will equate SPKR to this hexadecimal value. Finally, our comment field tells the programmer or anyone else what this line is up to and why it is being used.

You also use EQU to set up a page zero address. For instance, this line...

...tells us that BASL really means page zero address $28, anytime we use this label as an operand.

These EQUs are very important, and you usually equate everything near the beginning of the program, long before you use any of these labels.

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Every label must be defined once and only once in some label field. There are at least three ways to do this: (1) you can use the EQU pseudo-op to define a label as an address or a value ahead of time; or (2) you can use a label in a label field of a source code line to define a label as a working address pointing to a "real" program line in your object code; or (3) you can use the upcoming DFB pseudo-op to define a label as a file start or a file entry.

We'll have more to say on EQUs later.

CHN

This one stands for chain, and gives us a way to tie two or more source code files together. For instance, a command of CHN PART2 will go into the disk and continue with part two of the assembly. CHN should always be on the last line of any source code file, since that file gets replaced with a new one on the chain command.

When you chain two programs together, all the labels and the current assembly address are passed on to the second source code module. CHN is somewhat similar to the "continuing printing" command in a word processor program.

Also RANS—

There are six lesser used structure pseudo-ops.

OBJ doesn't do anything in "old" EDASM. In "new" EDASM, OBJ lets you do in-place assembly. The OBJ pseudo-op also lets you assemble the code in the Apple's memory in a place different from where it is to actually run. "OBJ" stands for "object code location"; compared to "ORG" which shows the final starting place where the code is to actually run.

DSECT and DEND set aside an area of memory without forcing you to put actual values into each location. These pseudo-ops are not often used by beginning programmers. The "D" stands for dummy, as in dummy section.

REL is the pseudo-op used to generate relocatable code using Apple's special relocating loader. Most of today's code for the Apple II will only run in one place and does not need the extra complications of relocatability. More details in the EDASM manual.

EXTRN and ENTRY give you ways to either use an outside label or pass a label to the outside. These see little use in shorter programs. They do get most handy if you are splitting things up into modules that have to work with each other or with a supervisory program.

File Pseudo-Ops

The file pseudo-ops are used to help you build files, and other parts of a program that do not use op codes. There are two important ones, and four that see lesser use.

Files are the main way you have of providing lots of data inside a machine language program. You might have ASCII text files, tables of addresses, shape or sprite information, musical notes, table lookup values, or most anything else in your working files. The best and most general programs will use fairly short machine language program code to control large and easily changed files.

DFB

The pseudo-op DFB stands for define byte. This gives you a way to enter one or more file values.

For instance, the source code line...

```
312 NOTEFLE DFB   $6E,$5C,$8A,$6E,$3D,$3D,$A4,$82
```

..puts the value hexadecimal $6E into the file whose starting address equals NOTEFLE. The operand here can be in hex, in decimal, or can even be a label. Whatever you use, the operand must be convertible to an 8-bit data value ranging from hex $00 to $FF, or from decimal 0 to 255. Sometimes you will put a label on each file entry, while other times you just name the base address at the start of the file.

Should you want to put bunches of note values into your note file, use commas and keep going...

```
312 NOTEFLE DFB  $6E        ; HIGH OCTAVE NOTE A#
```

...In this case, we end up with eight file values stuffed into the file called NOTEFLE. Value $03 goes into the first location, $05 into the second, and so on. In this case, the label only applies to the first data entry. You can hit the $05 with a "calculated" NOTEFILE + 1 label and the $07 with NOTEFILE + 2 label, and so on.

For best appearances, limit your DFB file entries to eight per line. Use no spaces between entries, and don't forget that "$" sign for hex values. Normally, you do not use comments when you have long file entries, since the printout will get messy. It is permissible to "pad" your first data value with three spaces after the DFB. This moves all the data values over into the comment field for a cleaner listing. Any extra spaces between DFB and the data values will get ignored by EDASM.

Be sure to not end your data values with a trailing comma. This confuses EDASM and might throw in an extra $00 value on the end. And don't forget those "$" signs. It's real easy to leave one off, plowing up a single data value. Also, be sure to not have spaces between your file entries.

If you are involved with very large or very long files, it might be better to skip over the file area during the assembly process, and then load the file as a block off your disk. A file of a hundred or more characters takes a lot of typing and burns up a lot of disk space.

Sometimes other programs, such as a word processor, a data base manager, or a custom file generator, might be a better way to build very long or very involved files.

For instance, say you needed a cosine table for a plotter's "circle fill" routines. You could use Applesloth to calculate the values and then insert them as needed, along with commas and dollar signs, into a text file that is readable by your assembler, or else in a ready-to-use binary file format. The final code is then inserted into your machine language object program as needed. Long files most often go at the end of a machine object program and are thus easily appended.

Note that DFB simply puts data values into program locations. Most machine language programs have two areas of code. One area contains op codes pieced together into legal 6502 commands. The other area holds numbers, characters, or other data values that are accessed and used by the working code portion of the program.

It is very easy to get EQU and DFB mixed up. Here's the rule...

> Use EQU to equate values and address labels BEFORE your "real" op codes.
>
> Use DFB to define files and file entries DURING or AFTER your "real" machine language op codes.

Normally, you pre-establish values and op code ahead of time with the EQU pseudo-op. You post-define files and file entries with the DFB pseudo-op.

Should you have a short stash inside your running machine language object code, you put your DFBs inside the code as the need arises. Just be certain that you use these stashes as stashes and don't try to execute them as op codes.

ASC

This pseudo-op is short for ASCII, and lets you create a file of ASCII characters. The first and last characters of the operand are delimiters that separate the message from any comments later in the line. The delimiter symbol must not be included in the ASCII string.

For instance, the source code line..

...will put the code for an ASCII capital "H" in the first location of the messasge file, the code for a lowercase "i" in the second location, and so on. In this example, the quotes are the delimiters. Everything after the first delimiter and before the second delimiter is put into memory as ASCII characters. Should you want to print a quote, you use a different delimiter symbol pair, such as a "/" (slash) at the start and end of your text string.

The delimiter is not allowed to appear in the text message. It is usually a bad idea to tack a comment on the end of an ASC pseudo-op since the printout will get messy. An interesting quirk of EDASM is that you do not need the second delimiter if you have no comments. But watch out for tail-end spaces if you try this.

Once again, if you have very long text messages that aren't going to change much, you are better off generating those messages with a word processor and then separately combining the message files into the assembled program. Otherwise you are into lots of typing and need mucho disk space for your source code programs. Another advantage of "new-way" word processing is that you can easily include uppercase and lowercase in your messages, even with older Apples.

Provided, of course, that everyone who is going to use your program has some way to display lowercase.

ALSO RANS—

This time, our less-often used pseudo-ops give us special ways of entering special things into files.

MSB lets you clear or set the most significant bit of any

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```
645 MSGFLE   ASC   "Hit any key to continue"
```


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ASCII characters that are generated by the assembler. MSB ON sets that bit, and MSB OFF clears that bit. For most Apple uses, ASCII has its MSB set. ASCII with its MSB off is sometimes called low ASCII, while a set MSB is called high ASCII.

The DCI pseudo-op lets you build ASCII files that use low ASCII for all but the last character and high ASCII for the final character. Which gives you a very special-use way of telling when you get to the end of a message. This slightly shortens text messages since you may no longer need a special "end-of-text" marker, such as an ETX or a NUL.

The DW pseudo-op defines a double-byte, or a 16-bit word put in memory backward, the way a 6502 expects a low, then a high, address. This is most used for lists of addresses.

The DDB pseudo-op lets you define a double-byte, or 16-bit word put in memory exactly the way you show it in the operand.

Use DDB for "frontward" entry. Use DW for "backward" entry for 6502 addresses.

The DS pseudo-op stands for Define Storage. This one gets used to set aside an area for file values without actually defining those values at the present time.

Conditional Pseudo-Ops

There are three special pseudo-ops in "old" EDASM that let you do conditional assembly. Conditional assembly means that you can assemble only certain parts of your programs under certain conditions.

Conditional assembly is very specialized, but is most useful when you want to use one master program to handle several different options of final object code. Since this is an advanced technique, we aren't going into too much detail here.

The three pseudo-ops involved are called DO, ELSE, and FIN, and are always used in their alphabetical order. See the EDASM manual for more details.

On "new" EDASM, there are many new and more powerful conditional execution commands.

Your Own Assembler

That just about sums up the pseudo-ops. We have been careful to show you the more important ones, and those that you are more likely to want to use early in the game. We have seen that a pseudo-op is a special instruction that we send to the assembler for use during assembly time.

We can arrange pseudo-ops into pretty printing, structure, file, and conditional assembly groupings.

The pretty printing pseudo-ops are used to make the final printout attractive, and include PAGE, SKP, LST, and SBTL.

The structure pseudo-ops are

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Continued from page 83

used to organize the source file assembly process, and include ORG, EQU, and CHN.

The data pseudo-ops are used to create data files of numbers or text characters. Of these DFB and ASC are the most important.

Finally, we have conditional pseudo-ops that let you assemble only parts of a program. These are not needed for most simple assembly jobs.

I've tried to present things in a totally different way than the EDASM manual does. If you have any problems, be sure to check into their way of presenting things as well.

If the right one don't get you then the left one will.

But what if you are going to use a different assembler? You'll find things pretty much "alike but different somehow."

Go back through this chapter, and any place you find an identical pseudo-op or way of doing things, paint it green with a transparent page highlighter. If there are obvious differences, paint the problem areas pink with another highlighter. If the difference is minor, note it in the margin. Then list the important differences in the box on the next page.

Things may look a little fuzzy at this stage of the game.

Blurry even.

Our ripoff module examples should clear things up. Before we find out how to write a source code file, though, we need ways to organize the source code lines into something that is readable and works. We can call this our..

Source Code Structure

We now know that the source code is a script, or a series of instructions that we send to an assembler program. The assembler, in turn, takes these instructions and uses them to generate object code, or a runnable machine language program. We also know that the source code is made up of code lines, and that each line has a number field, a label field, an op code field, an operand field, and a comment field. Very special rules have to be followed for the use of each field.

What next?

Obviously, we have to decide which lines go where in your source code. But, where do you begin? Exactly how do you arrange your source code so that it will both generate useful object code for you and still keep it understandable and self-documenting?

Think about the *structure* of your source code...

STRUCTURE—
The sequence and arrangement of lines in a program or source code.
Also, any methodology for writing programs or source code.

Structure is nothing more nor less than how you arrange a particular program. In the case of assembler source code, structure involves which lines go where in what order.

Now, structure may sound great, but it is really one of the most dangerous and most insidious things you would *ever* want to let appear in *any* computer program. One of the obvious reasons is that...

ANY ATTEMPT WHATSOEVER IN USING STRUCTURE IN A PROGRAM WILL SURELY LIMIT YOU ONE WAY OR ANOTHER AND IS CERTAIN TO RETURN TO HAUNT YOU!

Structure may limit how fast you can do things. Or, it may force your program to take up too much room. Or, it may restrict you from doing what you want to do in the way you want to do it. Structure may simply ignore most of the resources available to you.

Remember, the whole truth and beauty of machine language code is that anything goes! And, if structure ever gets **between you and anything, that's ungood. In fact, if you are to become a decent machine language programmer, the foremost tenet of your beliefs absolutely *must* be that...**

ALL STRUCTURE IS INHERENTLY AND INTRINSICALLY EVIL!

Structure, of course, is what makes BASIC so bad, Pascal utterly ludicrous, and what renders Ada totally unspeakable in polite company.

Why, using structure is almost as bad as using a road.

If you are traveling on land, you will almost always have a more challenging trip, a more informative trip, and a vastly more creative trip if you do *not* travel by road.

First, the road will take you where it wants you to go, rather than where you really should be headed. Secondly, the road will very severely limit your choice of a mode of transport. Using a road also drastically restricts your possible travel speed to a very narrow range. Contemplate a sunset in the fast lane sometime and see what happens to you.

While in a canoe.

A road will also have all sorts of silly regulations as to which side to travel on, access rules, license demands, speed limits, vehicle restrictions, and lots of other dumb things that go with the totally nonsensical concept of structure. Needless to say, you *always* end up paying to use a road, one way or another.

But the most insidious and most despicable thing about a road is that others will have traveled it before you, still others will travel with you, and yet others will travel it after you. Which very severely demeans the experience for all.

So, structure is inherently and intrinsically evil. Particularly if it gets between where you are and where you want to go.

Or become.

As a machine language programmer or an assembly language programmer, you are totally free to pick and choose as much or as little structure to your programs as you feel comfortable with. But, don't ever go along for the ride just because there's some stupid and misguided attempt at structure that "they" want you to use.

What we are really saying is...

Go ahead and use any structure you may feel comfortable with,
BUT—
Be ready to fire bomb the mutha at any time for any reason.

So, now that I've shown you how bad structure is, I'll show you some structure.

It is the structure I use for my assembly language programs. Just as with any structure, mine is severely limiting and restrictive. The only thing nice you can say about it is that my structure is orders of magnitude less limiting than BASIC, and infinitely less restrictive than Pascal.

So, use my structure if you like. If not, go ahead and do anything you like.

Remember...

Anything goes in machine language!

Anyway, the goals of the structure I use are, first, to make the assembler put together the object code in a reasonable way, and secondly, to be attractive and understandable to people for later use.

There are 16 parts to a source code listing that follow my structure...

Continued on page 89

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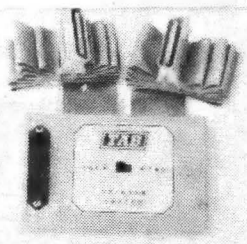

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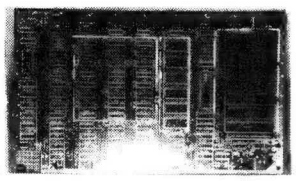

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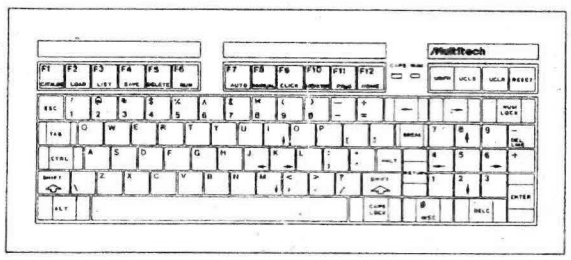

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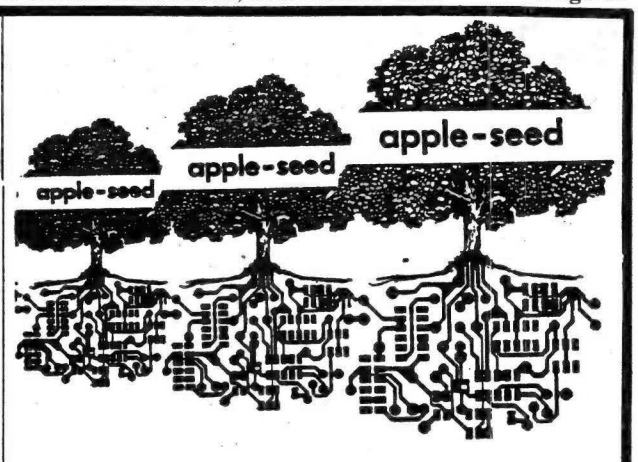

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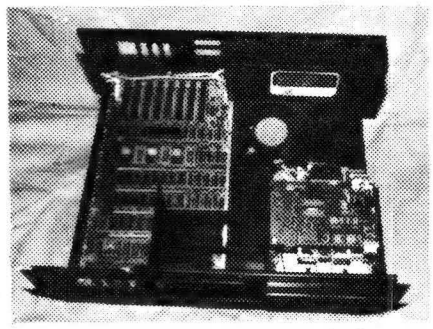

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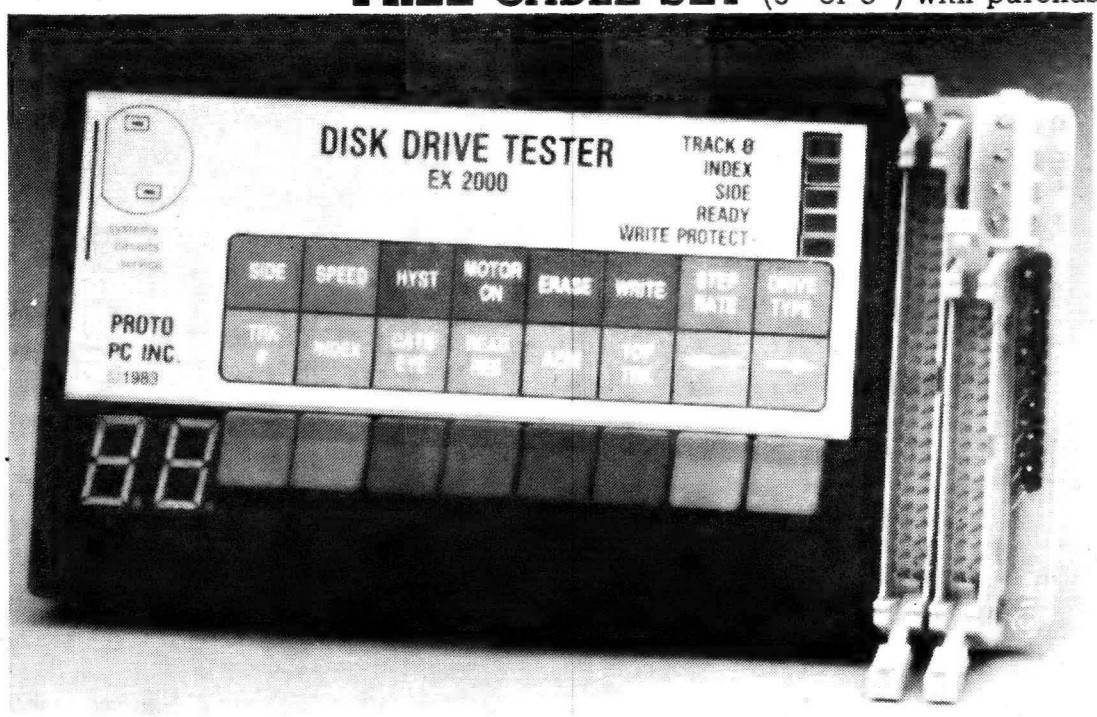

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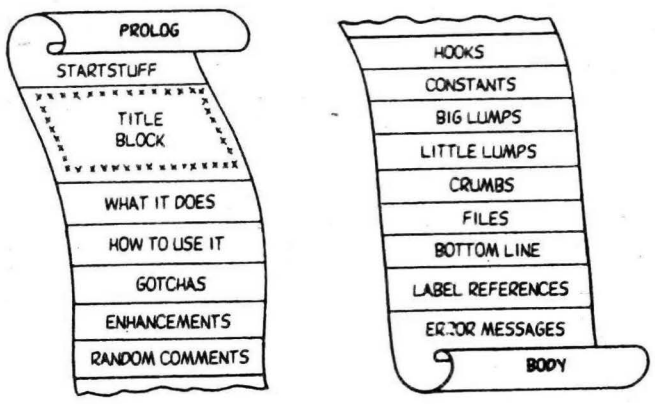
Lancaster Continued from page 84

SOURCE CODE STRUCTURE:



To make this structure easy to understand and use, it has been put into a ripoff module called the EMPTY SHELL.SOURCE, and will be our first ripoff module in Part II.

Many of today's assembler listings seem all cramped together and hard to read. The main reason for this is that the programmers are attempting to save on source code length or are otherwise suffering from some form of dino dementia. With most any modern Apple assembler, there is no reasonable limit to the length of source code. So, any time some blank space or some formatting commands make the source code read better or seem better thought out or better organized, use them...

NEVER try to save source code file space at the expense of legibility or clarity.

ALWAYS spend the time and space you need to create a source code file that is easy to understand and pleasant to read.

Another essential rule is that...

More than one half of your source code should be documentation aimed at informing the reader or user.

Remember that source code must serve two ways. First it has to be usable by an assembler to generate object code. But secondly, and equally important, source code must be legible and understandable by a user or customer. The source code should always explain exactly what a program does, exactly how a program does it, and exactly how a program can be modified, either for an upgrade or for a move to a different machine.

By the way, you will just about *never* make a hard copy of your source code. Instead, you use a combined source and object code printout that gets generated "free" when you do an assembly. This combined source and object code is called an *assembler listing*...

ASSEMBLER LISTING—

A hard-copy printout that combines source and object code onto one single document.

Assembler listings are the most common way of showing source code.

The assembler listing is by far the most common way of keeping hard-copy records of the assembly process. Any time you read a magazine article that includes machine language code, you'll find an assembler listing of one kind or another present. We'll see more details on reading an assembler listing later.

One big advantage of assembly listings over "pure" source code is that assembler listings show you the generated machine language object code that goes directly with the source code. You can often spot nonsense op codes this way, and the versions won't get mixed up as well. You also cannot normally get an error-free assembler listing of something that will not assemble. This forces you to save only records of code that will at least assemble properly.

The EDASM assembler automatically generates assembler listings during assembly if you turn the printer on with a "PR#1" command. Other assemblers will do the same thing one way or another.

You rarely would want to make a printed copy of your source code for a record or for publication. You create source code on screen and save source code to disk or to RAM for assembly, but you use assembler listings for your records and final hard copy...

Hard-copy printouts of "pure" source code are rarely used or needed.

Instead, use assembler listings for your records and publication.

There is one little hangup about assembler listings, though. Remember those pseudo-ops? An assembler listing will show you the *result* of a formatting pseudo-op, rather than listing it...

Certain pseudo-ops, such as PAGE, SKP, and SBTL will not appear on an assembler listing. Neither will their line numbers.

Instead, you will see the results of these pseudo-ops instead, such as a new page, numbered headers, or skipped lines.

So, if you have a line number missing on an assembler listing, chances are that line number was a pseudo-op intended to format things one way or another. If line 25 is missing and replaced with six white spaces, obviously a SKP 6 is inferred here where the "missing" line belongs.

An important point...

Your assembly listings should be works of art that must stand on their own merits, separate from any code they may generate.

You should be as concerned about layout, appearance, and how images fit the page as would a calligrapher or poet.

There are two halves to my source code structure. The *prolog* mostly holds documentation intended for the user, while the *body* mostly holds commands for the assembler...

Continued Next Month

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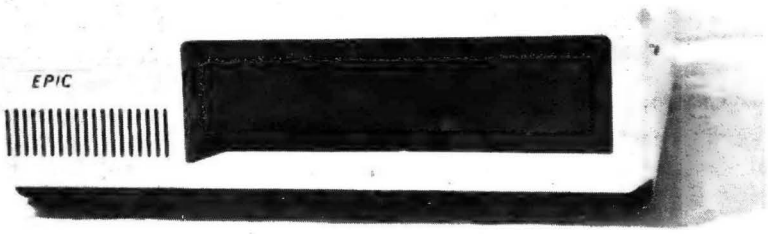

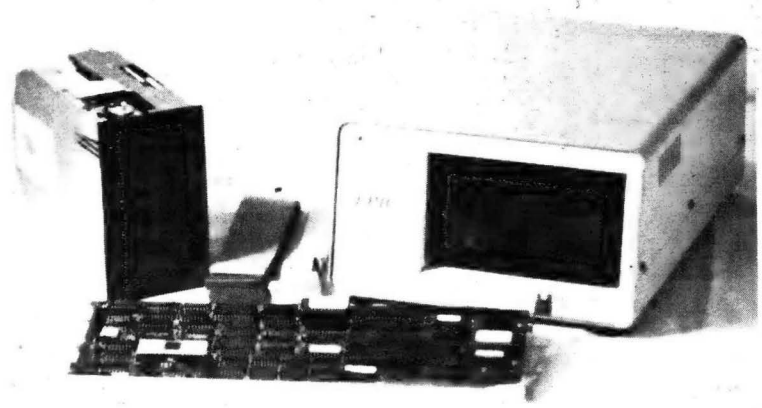

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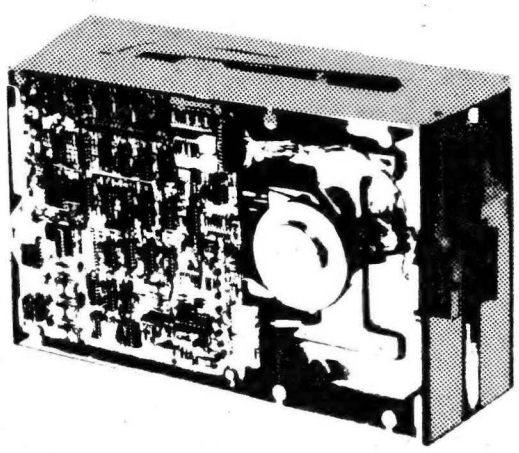

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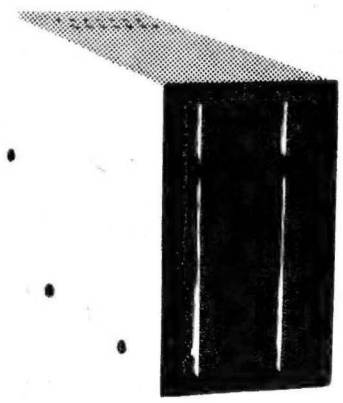

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MISCELLANEOUS

MSX: A Revolution In Home Electronics?

by Robert Chapman Wood

Sony, Yamaha, and other Japanese manufacturers will show MSX computers at the Winter Consumer Electronics show in January that may not sound very exciting at first: They'll probably be 64K machines at prices significantly above the Commodore 64's. The immediate excitement will be in the related devices the Japanese have made MSX work with—and perhaps in the dramatically greater performance of MSX disk drives compared to Commodore and Apple drives. But there's lots more excitement to come.

Recent introductions in the Japanese market include computers from 12 manufacturers, all compatible with each other, and most designed to work with various add-on devices such as:

- Computers from Yamaha Corp. that can run the software of the others but can also either function as an electronic organ themselves or work with Yamaha keyboards to produce music with a vast array of effects
- Computers from JVC and Mitsubishi which work with and help control video tape recorders and home audio systems
- Computers from Nippon General Corp. and Pioneer that can run the full range of MSX software that are built into a television and a laser disk player

All these have been only moderate sellers in Japan so far—and for a good reason. Prices for all these products make them more expensive than most consumers are willing to pay.

But don't think the Japanese have made a mistake. Remember when they introduced home videorecorders costing $1,500 and blank videotapes costing $32.95? Today, prices are less than one-fifth what they were only five years ago—although there hasn't been a single technological breakthrough in the field. At introduction, Japanese MSX computers will cost more than Commodore computers because there's much more in them than in Commodore computers. But the Japanese are planning to do with MSX computers exactly what they've done with video tape recorders, and when they've taken all the costs they can out of them, we'll have true electronic homes.

The promise of MSX includes:

- A computer in every room of the house
- A network system that replaces electrical, telephone, and television cables with a single "home bus" network that ties every home appliance to a national information grid
- Complete, communicating computers so cheap that they can be built into televisions, video tape recorders, and telephones
- A $900 computer system with the memory capacity and power of an expensive hard-disk office machine
- A family of computers that makes the whole house intelligent

The Japanese industry is moving deliberately to introduce the machine in ways that will re-make the home life of anyone, anywhere in the world, who can afford a full complement of home appliances.

MSX is a standard developed by Microsoft and adopted by virtually the entire consumer electronics industry in Japan. In addition, it's been adopted as a standard by the leading electronics manufacturers in Korea, by a large Hong Kong electronics company, and by the European electronics giant Philipps. Zenith and RCA, the leading U.S. home electronics companies, are still thinking about it. The biggest question mark in the short term is whether it will also be adopted by Jack Tramiel's Atari Corp. Several Japanese MSX products should be on the U.S. market by Spring 1985.

MSX' strengths are subtle, so that it may be hard to explain them to the first time computer buyer as long as machines like the Commodore 64 remain cheaper than MSX products.

Continued on page 94

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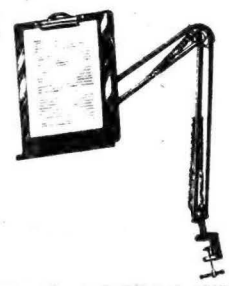

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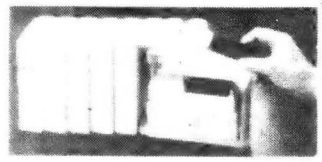

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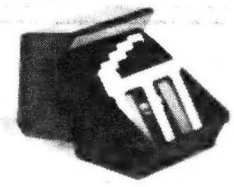

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LED's glow at 3V & draw only 3 MA at 12V

MODEL	DESCRIPTION	1-9	10-24	25
DLM	Data Line Monitor	37.35	33.99	29.88

RS-232 SIGNAL CHANGER

A unique Switch Box that allows any I/O combinations

When re-configuring terminal or modems, wiring must be altered to handle I/O signals. These changes could be frustrating. An RS-10 can do it easily, simply move the dip switches to open, close or even crossover lines. Supplied with 12 ft. cable with RS-232 Male terminations.

RS-10.....99.00 2 or more.....88.00

Qualified Dealers **WANTED** Call Mark Tomkins for Details

COAXIAL CABLES

W/Molded **BNC** Connectors On Each End

MODEL-ft.	1-9	10-24	25-99
RG58C/U - for Instrumentation Use			
CC58C-1	3.55	3.23	3.05
CC58C-2.5	4.10	3.73	3.53
CC58C-5	4.65	4.23	4.00
CC58C-10	6.05	5.51	5.20
CC58C-15	7.45	6.78	6.41
CC58C-25	10.25	9.33	8.82
CC58C-50	17.25	15.70	14.84
CC58C-100	31.25	28.44	26.88
RG59B/U - for Video & General Use			
CC59B-1	3.65	3.32	3.14
CC59B-2.5	4.00	3.64	3.44
CC59B-5	4.75	4.32	4.09
CC59B-10	6.25	5.69	5.38
CC59B-15	7.75	7.05	6.67
CC59B-25	10.75	9.78	9.25
CC59B-50	18.25	16.61	15.70
CC59B-100	33.25	30.26	28.60
RG62A/U - for Computer Applications			
CC62A-1	3.60	3.28	3.10
CC62A-2.5	3.95	3.59	3.40
CC62A-5	4.70	4.28	4.04
CC62A-10	6.15	5.60	5.29
CC62A-15	7.60	6.92	6.54
CC62A-25	10.50	9.56	9.03
CC62A-50	17.75	16.15	15.27
CC62A-100	32.25	29.35	27.74
RG174U - for General Use			
CC174-1	3.60	3.28	3.10
CC174-1.5	3.75	3.41	3.23
CC174-2	3.90	3.55	3.35
CC174-2.5	4.05	3.69	3.48
CC174-4	4.50	4.10	3.87
CC174-5	4.80	4.37	4.13
CC174-10	6.35	5.78	5.46
CC174-15	7.90	7.19	6.79
CC174-25	11.00	10.01	9.46
CC174-30	12.55	11.42	10.79

RS-232 GENDER CHANGERS

Needed when RS-232 cables won't mate. Our DG Series are compact and feature trouble free PC Board construction and lower cost. Choice of shielded or unshielded. Keep some for emergency needs.

MODEL	GENDER	1-9	10-24	25
DG-25F	(F-F)Unshielded	16.95	15.42	13.56
DG-25M	(M-M)Unshielded	16.95	15.42	13.56
DGS-25F	(F-F)Shielded	18.65	16.97	14.92
DGS-25M	(M-M)Shielded	18.65	16.97	14.92

IBM-PC PRINTER CABLE

Molded RS-232 to Centronics. This popular cable mates IBM-PC's. Available in two lengths.

IBM™-PC

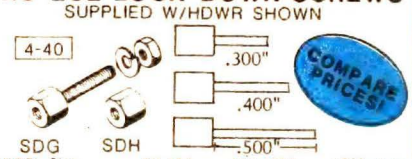
MODEL	FT	1-9	10-24	25
CMX6-IBM	6	39.95	36.35	34.36
CMX12-IBM	12	44.95	40.90	38.66

CUSTOM CABLES On Special Order

PIN OUT	
1	1
14	14
15	32
16	31
17	36
18	33
19	19
20	21
21	23
22	25
23	27
24	29
25	30

RS-232 LOCK-DOWN SCREWS

SUPPLIED W/HDWR SHOWN



MODEL-Size	50-450	500-1200	1200-over
SDG-300	.18	.17	.16
SDG-400	.19	.18	.17
SDG-500	.20	.19	.18
SDH	.11	.10	.09

NOTICE: Multiples of 50 Only

PARALLEL (Centronics) GENDER CHANGERS

Mates Centronics parallel printer cables that are of the wrong sex. All 36 pins are wired through. Bright metal construction. Mating Centronics cables are shown below.

MODEL	GENDER	1-9	10-24	25
DGS-36F	Female-Female	36.95	33.62	29.56
DGS-36M	Male-Male	36.95	33.62	29.56

IF YOU DON'T SEE IT We probably have it in stock or we could make it for you.

CENTRONIC SOLDER-POT CONNECTORS

MODEL	Use With	1-24	25-99
CEN-36PC	Rnd Cable	7.95	7.00
CEN-36PF	Flat Cable	7.95	7.00
CEN-36PN	Panel Mt	6.95	6.12
CEN-36SC	Rnd Cable	8.95	7.88
CEN-36SF	Flat Cable	8.95	7.88
CEN-36SN	Panel Mt	7.95	7.00

Molded DIP-16 CABLES

16 CONDUCTOR-One end open

MODEL-ft.	GENDER	1-9	10-24	25-99
ML16P-1	Male	3.95	3.59	3.40
ML16P-2	Male	4.25	3.87	3.66
ML16P-3	Male	4.55	4.14	3.91
ML16S-1	Female	3.95	3.59	3.40
ML16S-2	Female	4.25	3.87	3.66
ML16S-3	Female	4.55	4.14	3.91

RG59B/U COAXIAL CABLES

W/MOLDED **TNC** CONNECTORS on Each End

MODEL-ft.	1-9	10-24	25-99
CC59BT-2.5	5.75	5.23	4.95
CC59BT-5	6.50	5.92	5.59
CC59BT-10	8.00	7.28	6.88
CC59BT-15	9.50	8.65	8.17
CC59BT-25	12.50	11.38	10.75
CC59BT-50	20.00	18.20	17.20

CUSTOM COMPUTER CABLES — Made To Order —

CENTRONIC CABLES

FULLY **SHIELDED** - 36 CONDUCTORS

MODEL-ft.	1-4	5-9	10-24
CE36-5	30.50	29.28	27.76
CE36-7.5	34.25	32.88	31.17
CE36-10	37.50	36.00	34.13
CE36-15	44.00	42.24	40.04
CE36-25	57.50	55.20	52.33

NOTICE: **Specify Gender** M-M or M-F Cable with 2 CEN-36 ends

RS-232 SURGE PROTECTOR

Guard against voltage spikes entering your RS-232 ports. Metal-Oxide varistors on lines 2, 3, and 7 clamp surges above 26 volts without affecting normal operation. This compact adapter mounts permanently in series, all 25 lines are wired through.

MODEL	DESCRIPTION	1-9	10-24	25
DSP	Surge Protector	28.95	26.34	23.16

WE ALSO STOCK BNC CABLES with
- Spade Lugs
- Female BNC
- Alligator Clips

WANG TYPE DUAL-RG59B/U

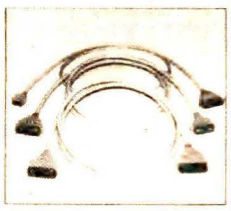
W/MOLDED **BNC** & **TNC** on Each End

MODEL-ft.	1-9	10-24	25-99
CC59WT-2.5	9.85	8.96	8.47
CC59WT-5	11.35	10.33	9.76
CC59WT-10	14.35	13.06	12.34
CC59WT-15	17.35	15.79	14.92
CC59WT-25	23.35	21.25	20.08
CC59WT-50	38.35	34.90	32.98

FULLY SHIELDED & MOLDED RS-232 COMPUTER CABLES

Features:

1. Excellent mechanical durability
2. UL recognized cables
3. Metal shell connector insert
4. Satisfies requirement for EMI/RFI shielding
5. Fully populated with 25 conductors



MODEL-ft.	1-9	10-24
CSM25-2.5	38.50	35.04
CSM25-5	40.50	36.86
CSM25-10	44.50	40.50
CSM25-15	48.50	44.14
CSM25-25	56.50	51.42
CSM25-50	76.50	69.62

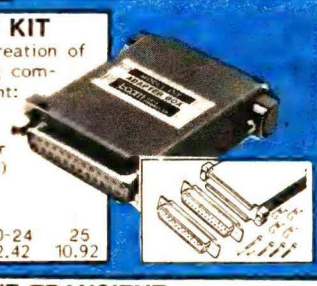
SPECIFY GENDER: Male - Male, Male - Female

We also stock CSM Series in 9, 15, & 37 pin

RS-232 DO IT YOURSELF KIT

This Do It Yourself Kit allows the creation of many RS-232 variations. The following components are included in the assortment:

- 1ea. Male 25 pin D-Sub Connector
- 1ea. Female 25 pin D-Sub Connector
- 2ea. Snap-on half covers (UL 94 VO)
- 1 set Hardware for Male & Female Connectors



MODEL	DESCRIPTION	1-9	10-24	25
DIY	Do It Yourself Kit	13.65	12.42	10.92

☐ FREE Catalog

Molded DIP-16 CABLES

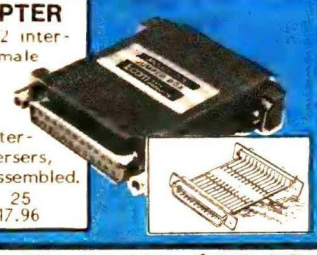
16 CONDUCTORS

MODEL-ft.	GENDER	1-9	10-24	25-99
ML16PP-1	M-M	6.85	6.23	5.89
ML16PP-2	M-M	7.15	6.51	6.15
ML16PP-3	M-M	7.45	6.78	6.41
ML16PS-1.5	M-F	6.95	6.32	5.98
ML16PSS-1.5	M-(2)F	11.45	10.42	9.85
ML16PSC-4*	M-F	8.95	8.14	7.70

*Coiled Cord 22" Unstretched

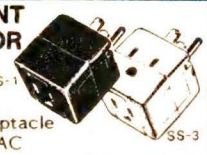
RS-232 DATA JUMPER BOX ADAPTER

A Data Jumper Box used to customize RS-232 interface devices. All 25 pins of the Male and Female connectors terminate to 25 solder pads. The PC Board is already wired to the D-Subs Supplied with 25 wires already stripped for permanent wiring to suit your needs. Many interfaces could be built - Null Modems, Pin Reversers, you name it! Supplied with all hardware unassembled.



MODEL	DESCRIPTION	1-9	10-24	25
DJB	Jumper Box	22.45	20.43	17.96

AC LINE TRANSIENT SURGE PROTECTOR



- Absorbs Spikes
- Safety Voltage Level
- Polarized Gnd'd Receptacle
- Rated: 15A 125VAC

MODEL	#taps	1-4	5-9	10-24
SS-1	Single	17.95	15.98	13.82
SS-3	Triple	19.95	17.56	15.36

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Wood
Continued from page 92

But MSX-DOS, the disk operating system for the computers, is said to give MSX computers virtually full compatibility with the well-established CP/M-80 operating system, which means that MSX at introduction will run one of the largest software bases in the world. In addition, MSX-DOS offers data compatibility with the IBM PC. The computers can also run ColecoVision computer games with trivial modification (but enough modification that ColecoVision games currently on sale in Child World won't run unless someone produces an adapter for them). And MSX-BASIC is virtually identical to IBM BASIC, with a few extra commands to take advantage of the MSX' superior graphics capability.

MSX system components also give the MSX a significant power advantage over home computers from Apple, Atari, and Commodore. The key components are a Z-80 microprocessor (the same microprocessor that powers CP/M and Coleco computers), a Texas Instruments TMS 9918A video chip, and a General Instruments AY-3-8910 sound chip. The Z-80 in the MSX runs more than three times as fast as the 6502 processor that powers most home computers today. In addition, the Z80 in the MSX has been provided with bank-switching memory capability which enable it to handle as much as 1,028K of memory—16 times as much as a Commodore 64 and significantly more than an IBM PC. And it has a sophisticated "interrupt system"—a system that enables the computer to run two programs at once or link easily with a network of data-sharing computers.

Meanwhile leading Japanese electronics companies have created large-scale integrations that will cut the cost of manufacturing MSX computers to well below the cost of current home computers. Already, MSX computers have been introduced in Korea which, Korean exporters say, could sell for well under $100 in the U.S. market.

Most important for today's home users, MSX avoids the radically cheap shortcuts that Commodore and Atari have used to keep the basic prices of their machines down. For example, Commodore and Atari machines communicate with disk drives through a specially designed, cheap-to-manufacture serial port, rather than the high-speed parallel interface used in office computers. This makes the computer itself cheaper to manufacture, but it makes the disk drive slower and more expensive to produce reliably. MSX machines use exactly the same kind of disk drives as machines already in offices.

On the other hand, the MSX has been designed to make expansion simple. Its internal read-only memory (ROM) contains "hooks" that make the addition of an entire range of devices relatively easy. While Commodore and Atari have difficulty supporting a large, 80-column display, for example, it is expected to be easy to add one to any MSX computer. In fact, Microsoft and Yamaha have already designed a new graphics chip which is now scheduled to replace the Texas Instruments video chip in MSX computers in 1986. The chip is designed to display colors as varied as the Amiga or Mindset computers and also allow MSX computers to display up to 80 letters on a line of text like an office computer (first generation MSX machines will only display 40 characters to a line). At the same time, the chip is expected to maintain full compatibility with previous MSX and CP/M software. When the new chip is introduced, consumers will no longer have any difficulty recognizing the advantages of MSX over other inexpensive computers.

MSX is thus a standard designed to give full play to the manufacturing and design **knowhow** of everyone in the computer business. It will provide the full power of today's technology in applications ranging from an $80 game machine through home word processing to $1,000-plus home devices no one has yet imagined.

The launching of MSX will set off an interesting battle between MSX and the Apple II series for position as standard in American homes. The Apple II series, despite a microprocessor a bit less sophisticated than the Z-80, can be expanded to do most of what an MSX could and might, at least in theory, be manufactured just as cheaply. But Apple has never pursued a low-price policy and, more important, has never encouraged others to make Apple-compatible computers. Apple's interrupt system is much harder to program than MSX', which makes Apple harder to network and a less sensible choice for such applications as monitoring a home security system at the same time the kids are doing their homework. In fact, it's extremely difficult to network a 6502 microprocessor like that found in Apples.

The IBM PC Jr. is more competitive with MSX in features and power, but it's hard to imagine IBM competing head-to-head on price with the Japanese and Koreans. Commodore products seem to have no long-term future as a standard. Even Commodore isn't committed to producing Commodore-64-compatible devices, as introduction of the incompatible new Plus-4 has shown.

Most importantly, no major manufacturer of consumer electronics goods seems to be preparing to mass produce appliances designed to network with Apples, PC Jrs., or Commodore 64s the way Japanese appliances are being designed to network with MSX computers. A September article in the Japanese-language magazine **ASCII**, which is published by the parent company of Microsoft's Far East headquarters, said that an upgraded version of MSX would eventually team up with the intercomputer networking standard (INS) now being developed by the Japanese Ministry of Posts and Telecommunications. The combination would revolutionize home life. A "home bus" would be developed that incorporated:

- Electrical power supplies
- Telephone service
- Connection to two-way cable television through fiber optic cables, and
- Local area computer networking

The article's author argued that the home bus would completely replace electrical outlets in the homes of the future.

Discussions of such long-term future projects are inevitably a bit speculative. The Japanese don't even expect to deliver samples of their intercomputer networking standard till 1986. But there are much more concrete medium-term plans for MSX. A Microsoft planning document made available to me earlier this year in Japanese laid out the following positioning of the MSX in the Japanese market for 1985-86. Positioning in the U.S. market is likely to be similar by 1986:

- A basic machine, capable of playing games but without a keyboard, would cost Y20,000 ($87)
- Home computers with a keyboard and 16K of RAM (expandable to 1,028K) would cost Y30,000 ($130)
- Complete home personal computer systems with one floppy disk and 64K of random-access memory (RAM) would cost Y50,000 ($220)
- More advanced personal computer systems with 2 floppy disks and additional features would cost Y100,000 ($435)
- Business computers with a hard disk capable of storing millions of bytes of data would cost Y200,000 ($870—perhaps one-third of the cost of similar

Continued on page 96

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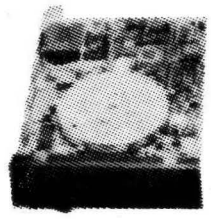

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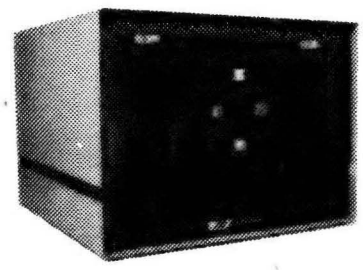

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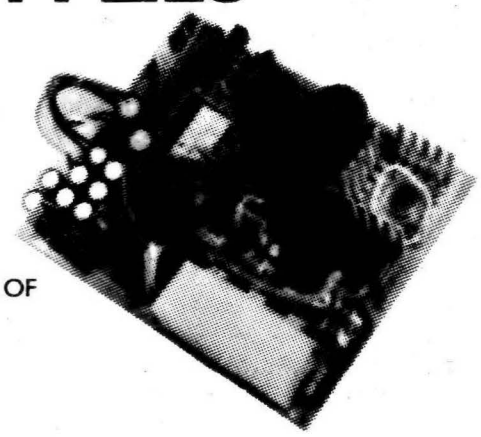

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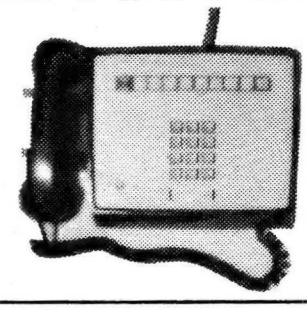

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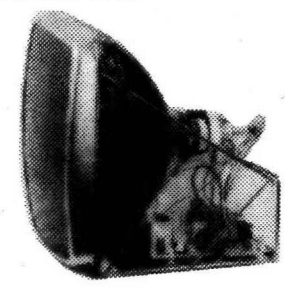

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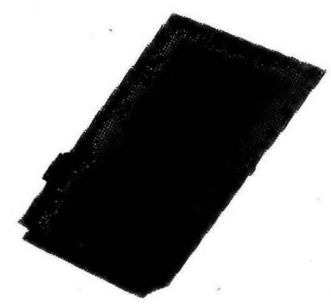

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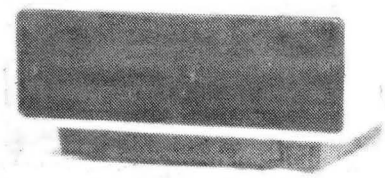

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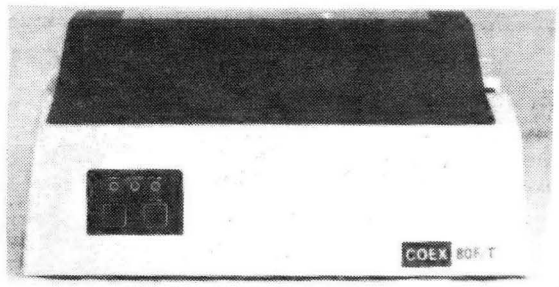

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I² Interface Introduces Five New Products At COMDEX

I² Interface, Inc. exhibited five new storage products for the IBM PC and PC compatible market at COMDEX in Las Vegas.

The series of I² Interface's popular external DiskSystems© has been expanded and now offers IBM formatted storage capacities of 55.7, 87.7 and 119.7 megabytes in addition to 10, 15, 22 and 33 megabytes. These systems include a 5¼" Winchester disk drive, controller, cabinet, power supply, I/O adapter and cable. The drives have a track-to-track access time of 5 milliseconds with average access time, including the head settling time, of 30 milliseconds.

Physical dimensions of these DiskSystems are 5.75"-/8.25"/15.25". The DiskSystems are bootable from the Winchester on some PCs, enabling the user to store programs on disk, while allowing fast access to programs and files.

I² Interface also exhibited its new 5¼" half-height internal DiskSystem which enables the user to inexpensively increase the capabilities of an IBM PC to those of a PC XT. Complete with faceplate, this Winchester disk drive has 10 megabyte formatted storage space with a data transfer rate of 5M bits per second. Track-to-track access time is 18 milliseconds and the drive, with faceplate, is designed to fit a standard 5¼" slot on the PC and PC-compatibles. When using DOS 2.0, this DiskSystem turns a PC into an XT at a low cost. The system includes cabling, a controller and utility software.

The final new product exhibited is a 5¼" half-height cartridge TapeSystem© which gives the user from 10 to 60 megabytes of formatted storage while allowing them the convenience of removable media. This backup system is designed to interface with standard Winchester and SA 450 floppy disk drive controllers, as well as the DiskSystems marketed by I² Interface. The TapeSystem utilizes either MFM or GCR data encoding mode and includes a connector, cable, floppy interface and host adapter.

All I² products are compatible with IBM PC, XT and portable models, plus other popular PC compatible computers. I² Interface systems are simple to install and do not require additional connectors or boards.

I² Interface has been supplying a wide range of floppy disk subsystems, DiskSystems and TapeSystems for personal computers since 1978.

For more information on the external 5¼" DiskSystem series, the 5¼" half-height internal DiskSystem or the 5¼" half-height cartridge tape drive, contact I² Interface, Inc., 21101 Osborne St., Canoga Park, CA 91304.

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Wood
Continued from page 94

systems in the U.S. today)

MSX machines have been widely sold in Japan since late 1983. They were introduced in Europe in September. It's not clear how aggressive the Japanese will be when they introduce the computers here. Japanese companies, where employees remain more-or-less for life, may not much care whether MSX computers are an immediate hit in the U.S.

"We're going to try to steer a middle course between the American approach which says you get out there and push your product like crazy even before it's ready, and the Japanese approach which says, 'What's the hurry, we have two years to introduce MSX,'" says Ron Hosogi, who is director of Far East Business Development for Microsoft. The Japanese want to establish a standard that will assure a stable future for them as consumer electronics producers.

MSX computers are likely to be built into at least some home appliances for the U.S. market (televisions and laser disk players, probably) as early as spring of 1985. With low-cost, power, flexibility, and the support of the most dependable consumer electronics manufacturers in the world, MSX products are almost certain to change the entire American home. MSX will allow a whole new generation of communicating appliances and creative home software.

In ten years, consumers may regularly call home when no one is there and tell the MSX-compatible computer in their microwave ovens to delay dinner a bit because they'll be late. Visionaries have always speculated that sort of possibility would become available to the consumer, but the MSX standard is the first product that indicates concretely how that kind of computer convenience can be accomplished.

The MSX standards could be the most important development in consumer electronics since the U.S. government promulgated standards for television broadcasting in the late 1940s. ●

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(For IBM PC or Compatibles)

The CGA-PC color graphics monitor adapter provides powerful video display interface with the IBM-PC or IBM PC compatibles. The CGA-PC supports two levels of graphics and text in black and white or color, offering high resolution quality and total reliability. With the CGA-PC, the IBM-PC or PC compatible can be used with both color and black-and-white video displays, including TV sets equipped with RF modulators, medium and high resolution video monitors, and RGB monitors. The CGA-PC puts a powerful array of both color and graphic capabilities at the command of the PC user.

The CGA-PC has two primary operation modes, text or alpha-numerics, and all-points-addressable graphics. Each one of these primary modes has several display modes.

Text/Alphanumeric Mode

High Resolution: 80x25 display (black & white or RGB)

Low Resolution: 40x25 display

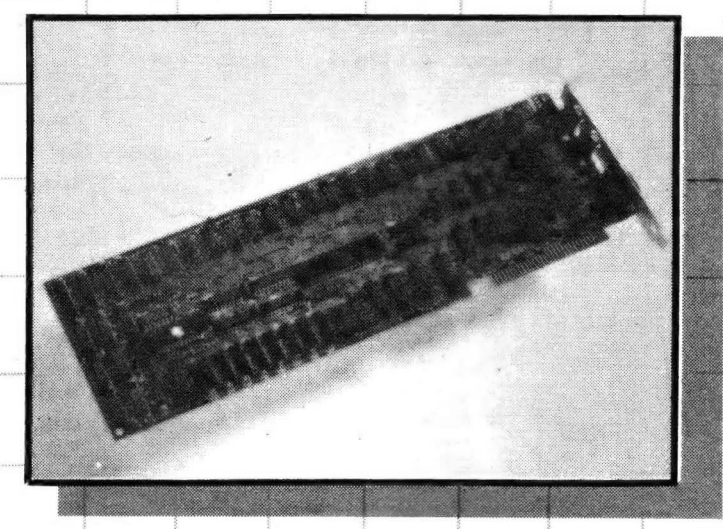
Colors: 16 foreground and 8 background colors

Video Attributes: Reverse video, blinking, highlighting, non-display

Character Size: 8x8 character box

Character Set: 256 characters and symbols in ROM-embedded character generator including: 96 character ASCII set, characters for games, foreign language, scientific notation, and word processing

Buffer: Four 80 column buffers or eight 40 column



Graphic Mode

Method: All points addressable

Low Resolution: 320x200 pixel four color display

High Resolution: 640x200 pixel black-and-white display

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Juki Introduces High-Speed Daisywheel Printer For Under $1000

The JUKI 6300 computer printer, one of the first 40-character-per-second letter-quality printers to be priced under a thousand dollars, has been officially introduced by JUKI INDUSTRIES OF AMERICA.

The JUKI 6300 offers a maximum speed of 40 cps (32 cps Shannon text). It uses a 96-character daisywheel and offers 10/12/15 pitch and proportional spacing. Unusually quiet for such a powerful printer (below 60 dbA), the JUKI 6300 offers a convenient 3k buffer memory (expandable to 15K), enabling the user to employ his computer for other purposes while the JUKI is printing.

The JUKI 6300 uses easily available Diablo daisywheels and ribbons.

The new JUKI 6300 offers a number of special print features such as graphics capability, superscript, subscript, underline, boldface, shadow printing, and more. Compatible with most personal computers, the JUKI 6300 features a belt-driven motor and light weight (31 pounds).

The JUKI 6300 can be equipped with either a standard Centronics compatible parallel interface or a standard RS-232C serial interface.

For more information, contact JUKI INDUSTRIES OF AMERICA, INC., 299 Market Street, Saddle Brook, NJ 07662

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Hayes Unveils 2400 BPS Modem

Hayes Microcomputer Products has introduced the Smartmodem 2400, which transfers data across regular telephone lines at speeds up to 2400 bps and offers a link between mainframe and personal computers.

"The Smartmodem 2400 offers ease-of-use with the latest in technology," said Dennis C. Hayes, president of the Norcross-based firm. "The latest modem from Hayes will establish the industry standard for 2400 bps communications and open new worlds in office automation."

The Smartmodem 2400 meets CCITT (Consultative Committee of International Telephone and Telegraph) V.22 bis requirements, the international standard for 2400 bps full-duplex data communications. Once the Smartmodem 2400 has been approved by telecommunications authorities in major markets, the modem will be able to provide link for data communications around the world.

The Smartmodem 2400 also meets V.22, the CCITT standard for 1200 bps communications and is very similar to V.25 bis, the proposed CCITT standard for auto-dial capability. Sharing the same features as the Smartmodem 300 and Smartmodem 1200, the new modem meets Bell 212A and Bell 103 requirements, the standards for data transfer within North America. Users can easily switch between CCITT and Bell transmission by issuing a command to the modem.

The Smartmodem 2400 operates both synchronously and asynchronously, which enables it to link terminals, personal computers, microcomputers, mainframes and information utilities. The modem supports asynchronous communications at 2400 bps, 1200 bps, and 600 bps and 0-300 bps and synchronous communications at 2400 bps, 1200 bps and 600 bps.

The Smartmodem 2400 uses state-of-the-art Digital Signal Processing (DSP) technology for intelligent transmission controls and other advances. This technology uses VLSI circuitry to provide high-quality, reliable data transmission at 2400 bps over ordinary dial-up lines. Intelligent transmission controls, which include adaptive equalization and retrain sequences, help ensure quality data transfer. Adaptive equalization monitors telephone line conditions to make sure that excessive transmission errors do not occur.

Features that make the Smartmodem 2400 easy to use include call progress monitoring, voice/data switching and the ability to set communication instructions with keyboard commands instead of with mechanical DIP switches. These communication instructions can be permanently stored in non-volatile memory. More importantly, the Smartmodem 2400 is easy to use because it employs a superset of the well-known Hayes "AT" command set. This means that Smartmodem 2400 is downward compatible with the Smartmodem 300 and Smartmodem 1200.

The modem has expanded capabilities to monitor the progress of a call, distinguishing between a busy signal, no dial tone or no answer. The monitoring makes it easier to use long-distance carriers like MCI or Sprint because the

Continued on page 100

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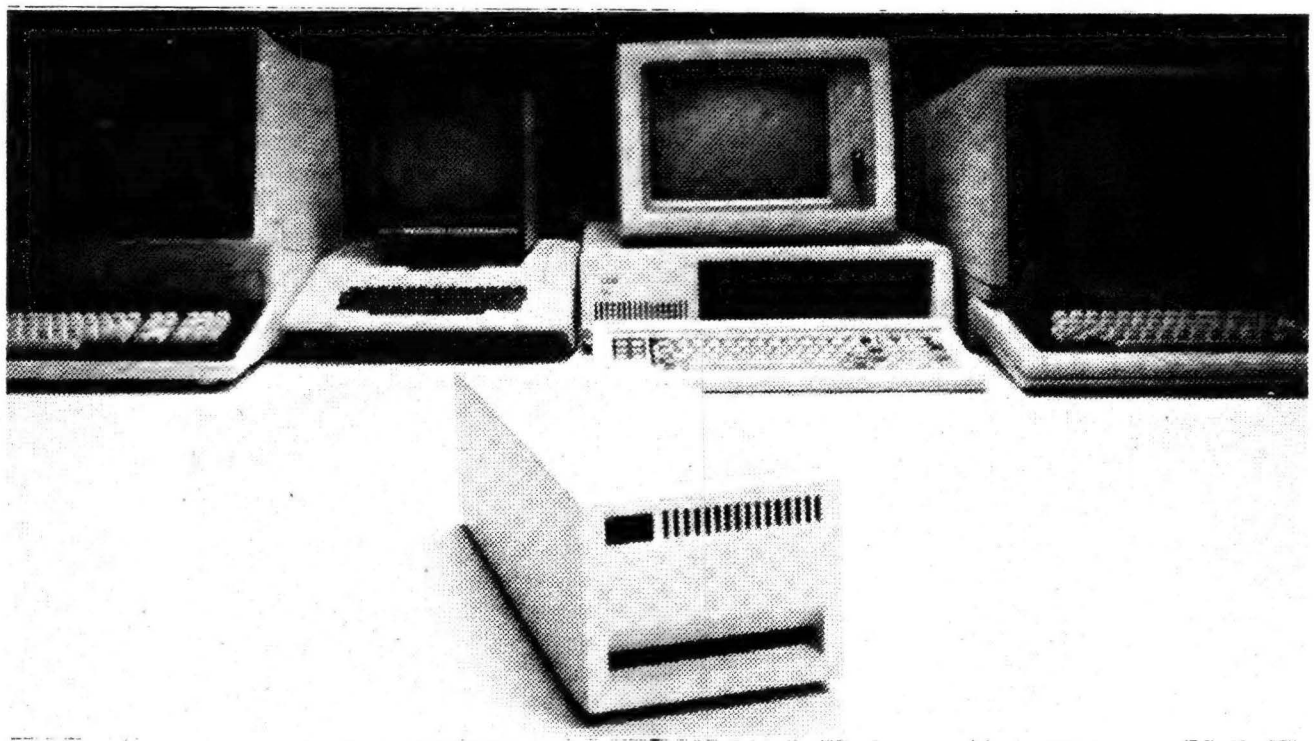

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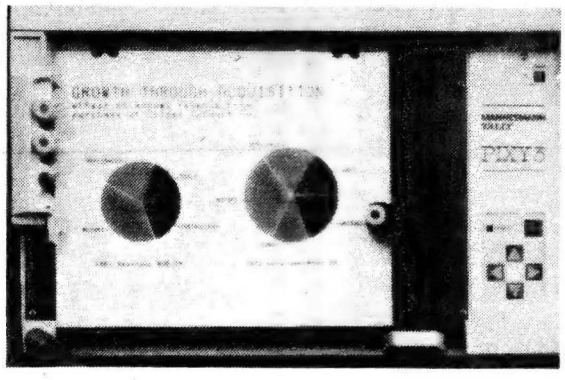

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Hayes

Continued from page 98

modem now waits for a second dial tone before dialing additional digits or commands. This feature also permits automatic redial of a number whenever a busy signal or no answer is reached. The Smartmodem even responds to the "quiet answers" — a period of silence which follows a connection — used by ROLM phones and many PBXs. The modem can then dial the access code needed to get a dial tone and extension.

The Smartmodem 2400 lets users switch back and forth between voice and data transmission, allowing users to set up a data transfer and confirm transmission during the same phone call. Users can also adjust the speaker volume with their software.

Other important capabilities of the Smartmodem 2400 include numerous diagnostic capabilities. Local analog loopback, digital loopback and remote digital loopback enable the modem to test itself without going on-line, test the remote modem or check the telephone circuits.

Visually compatible with its predecessors, the Smartmodem 2400 is housed in a brushed aluminum case with a speaker and eight bright LED lights to help monitor communications. The direct-connect modem features Touch-tone and pulse dialing, full- and half-duplex communications, auto-answer and autodial, and an RS232C interface which supports synchronous communications. The Smartmodem 2400 comes with a transformer, modular phone cable and a clear, well-illustrated manual.

The Smartmodem 2400 has an estimated retail value of $899 and comes with a two-year limited warranty (an optional four-year extended warranty is also available). Hayes customer service is available 12 hours a day at (404) 441-1617 beginning at 8 a.m. EST from Monday to Friday.

For more information concerning the Smartmodem 2400 and other Hayes products contact Hayes Microcomputer Products, Inc. 5923 Peachtree Industrial Blvd., Norcross, GA 30092. (404) 449-8791.

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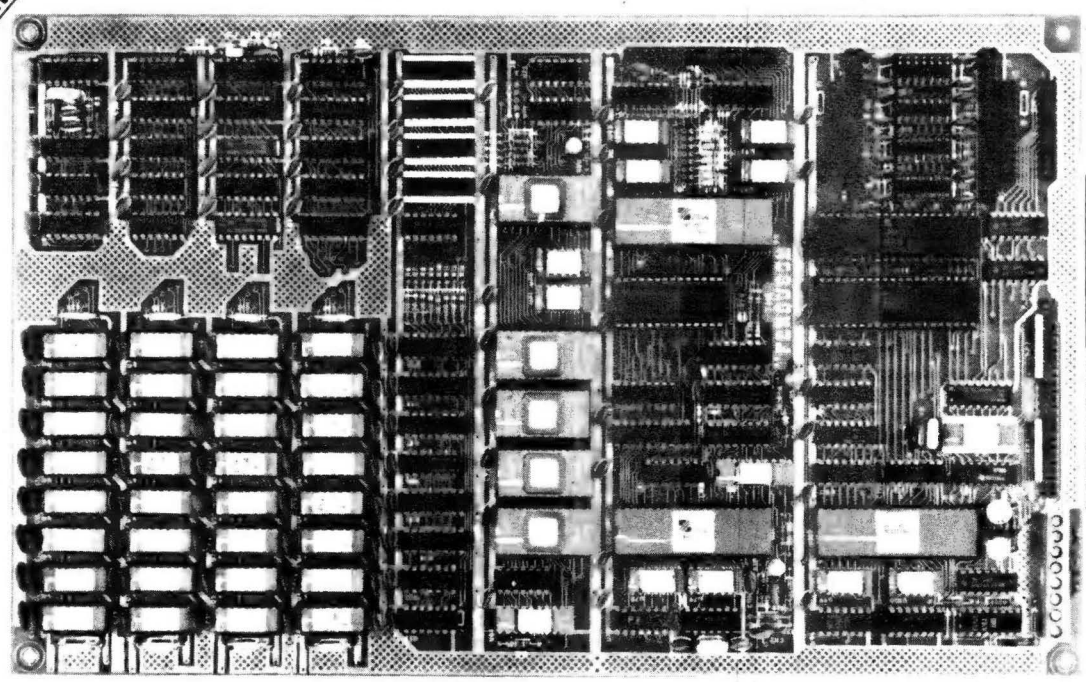

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New Kodak High Density Disks

Reliable, multi-megabyte information storage doesn't have to be hard. In fact, 5¼-inch flexible Kodak diskettes, HD 600, and the Kodak 3.3 flexible 5¼-inch disk drive work together to combine the high-density storage capacity approaching that of rigid disks with the security, convenience and cost-effectiveness of conventional miniflexibles.

When used with high-density 600 oersted (Oe) media like those available from Kodak, the 192 tracks-per-inch, half-height Kodak 3.3 drive provides 3.3 megabytes (Mb) of unformatted storage.

"Having three megabytes or more of storage available on a single, inexpensive, and removable flexible diskette provides important information-handling flexibility," said Robert B. Seebach, program manager for Electronic Consumer Products, with Kodak's U.S. Apparatus Division. "Users have an expanded storage capacity as well as easy back up of diskettes containing valuable or sensitive information for security. Hard disks are somewhat clumsy to back up, and files are difficult to protect from others who have access to the machine."

This flexibility is provided by a compact, half-height disk drive that also can read conventional 48 tracks-per-inch (tpi) diskettes, he continued. The Kodak 3.3 drive uses new technology that may yield even higher capacities in the future.

As an example of such new technology, Seebach cited a proprietary servo-mechanism which allows the drive to dynamically follow "data" tracks just 0.0052-inch wide. The design was developed by Drivetec, Inc., San Jose, Calif., and has been licensed for manufacture by Kodak at its Rochester, N.Y. facilities. The finished drives are marketed to original equipment manufacturers (OEMs), distributors, and retail outlets through Data Technology Corporation, of Santa Clara, Calif.

Seebach, who oversees manufacture and assembly of the drives at Kodak, noted that production of sophisticated electronic equipment is nothing new for the company.

"The control mechanisms in our line of consumer cameras are complex electronic devices that must fit in a rather com-

Continued on page 101

Kodak Disks
Continued from page 100

pact space," Seebach explained. "Also, the copier-duplicators we have manufactured for nearly a decade are computerized devices that are mechanically and electronically much more complex than these disk drives. So, we already have considerable experience and expertise in producing electronic equipment."

Seebach said that a marriage of electronics, mechanics, and disk technology makes it possible to squeeze multi-megabyte storage from flexible diskettes.

"Diskettes store data in digital form on the magnetic media's coated surface," Seebach explained. "The binary bits of computer information are represented on the diskette by the north/south pole orientation of magnetic particles in the diskette coating."

For convenience in measuring, reading and writing the data, diskettes are divided into concentric tracks, and each track is divided into sectors. The number of tracks on a diskette, the number of sectors per track, and the amount of information which can be stored in each sector may vary from drive to drive, and from one computer system to another. However, a sector usually contains 128, 256, or 512 bytes of information. The Kodak drive uses both 256 and 512 bytes-per-sector formats.

Seebach outlined two major factors which control how much disk storage is available per diskette with a given sector size. One is the number of bits of information that can be written per inch of track. This parameter determines how much data can be put on a given track. The second factor is the number of tracks on the diskette, commonly expressed in tracks-per-inch (tpi). A disk drive capable of reading and writing 96 tpi will hold twice as much information as one with only 48 tpi capacity.

"Of course," Seebach went on, "even if a disk drive is mechanically and electronically capable of recording and reading more bits per inch, or additional tracks per inch, the diskette medium has to be able to store this higher density of information."

Conventional 5¼-inch diskettes, he said, used by the majority of miniflexible drives, are rated at 300 oersteds (Oe), with oersteds being a measure of "coercivity." This is one way of measuring a magnetic media's ability to store information at a given density. Typically, as a media's coercivity increases, it offers greater storage capacity.

The Kodak 3.3 drives use 600 Oe diskettes, such as Kodak diskettes, HD 600, which are capable of storing information at higher densities than conventional media. The capacity gains, however, are not achieved by increasing only the number of bits-per-inch. Instead, the 3.3 Mb of unformatted storage result from a doubling of the number of tracks per inch to 192 tpi. With the Kodak 3.3 drive, this adds up to 160 tracks per side (320 tracks-per-disk), each capable of storing 10,416 bytes (8192 bytes formatted).

While the 3.3 drive currently uses a recording density of 9908 bpi, Kodak researchers feel this packing density may increase in the future to 20K bpi, or beyond, for even greater capacity using 600 Oe media, Seebach noted. He also added that the company's scientists foresee the possibility of increasing future track density to further enhance storage capacity.

"Several technological innovations were required to achieve 192 tpi densities, and more creativity went into the drive design in order to make it compact, extra reliable, and low in cost," Seebach noted. "Manufacturing the drive's

Continued on page 102

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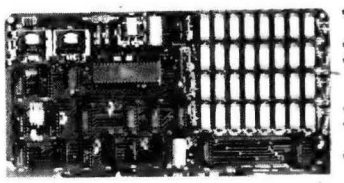

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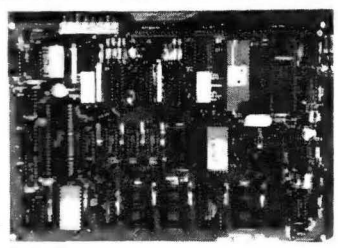

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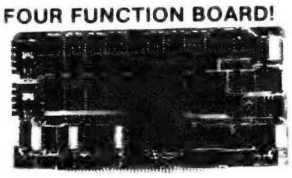

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Kodak Disks
Continued from page 101

read/write head was a major challenge. The width of the recording head gap must be less than the track width, of course. With 192 tpi diskettes, tracks are only 5.2 thousandths of an inch apart, center to center, and the head must be 4.7 thousandths of an inch wide."

Kodak's Spin Physics Division, San Diego, Calif., already has extensive experience in producing Microgap recording heads for a variety of uses. One example is the SP2000 motion analysis system, which uses a precise recording head to produce up to 12,000 frames per second on video tape used for motion analysis. So, the company called on Spin Physics' expertise to produce the head assemblies used in the 3.3 drive.

Seebach listed a second challenge -- to perfect the methods used to position the read/write head over the desired track. With conventional disk drives, precision stepper motor, usually working in conjunction with a lead screw, moves the head the required distance to the desired track. With 96 tpi drives, this mechanism must be very precise indeed to position the read/write head accurately.

Double the number of tracks to 192 tpi, and the task becomes several times more difficult. Movements on the order of 200 millionths of an inch are required to keep the head mechanism tracking properly. The polyester base used for diskettes is as dimensionally stable under changing temperature and humidity conditions as any thin, inexpensive human-produced material can be. However, at these recording densities, even tiny changes in size can change a track from a perfect circle to an oval that must be dynamically followed by the read/write head.

As a result, the 3.3 drives incorporate a proprietary track-following servo system. This mechanism works with track-positioning information that is permanently installed on the diskette when it is preformatted at the factory.

A stepper motor similar to that used in conventional drives positions the head carriage at the proper place. As the read/write head follows the track, it detects the servo "bursts" that are placed alongside the track, 17 times each revolution. These bursts of information are arranged on either side of the track, but not at the exact same place. Instructions built into a special EPROM (erasable programmable read only memory) chip interprets the servo burst information by comparing the amplitude (signal strength) of the right burst with the left. If one is stronger than the other, the EPROM's instructions tell the disk drive's microprocessor to move the head back toward the center of the track.

A fine-tuning stepper motor produces these tiny movements, on the order of 200 millionths of an inch, that provide the necessary degree of precision.

"Other features of the drive enhance reliability, reduce the need for service and maintenance and keep manufacturing costs as low as possible," Seebach maintained. "For example, unlike conventional drives that are filled with wires and cables, our 3.3 drive has no internal cables. Optical detectors and a light-emitting diode that actuates them are installed on printed circuit boards, instead of being mounted separately with attendant connecting wires."

This design, he said, results in a drive with minimal servicing requirements, and reliability on the order of one read error per 10^9 bits read (soft errors) and one per 10^{12} (hard errors). This technology being pioneered today holds the possibility of even higher data storage densities in the future, Seebach believes.

For further information contact Corporate Communications, Eastman Kodak Company, 343 State Street, Rochester, NY 14650. 716-724-4241. EV984172NR.

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Software Publishing Releases Enhanced Versions Of Four PFS® Products For MS-DOS Computers

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The new PFS:WRITE has an indent feature, which allows portions of text, such as quotations, to be easily indented inside a document. The enhanced PFS:WRITE also performs right margin justification at printing time and supports longer documents—up to 32 pages. Another new feature is the program's ability to select PFS:PROOF, Software Publishing's proofreading product, directly from the PFS:WRITE menu.

New features of PFS:FILE include: a "ditto key" for quick, accurate copying of identical information from a previous form in a single keystroke; the ability to perform automatic calculations within a file; and the ability to generate a "quick list" of information from a file and display it instantly on the computer screen.

The enhanced PFS:REPORT gives users the option of printing only the totals of a report, without printing all the data that went into it. Also, "invisible columns" allow users to perform calculations on values in a PFS:FILE file and display only the results in the columns of a report created with PFS:REPORT.

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All four enhanced products support DOS 2.0 pathnames and color monitors. They also have improved help screens for even greater ease of use.

Existing versions of PFS:PLAN, PFS:ACCESS and PFS:PROOF for MS-DOS computers are compatible with the new features found in the enhanced versions of PFS:WRITE, PFS:FILE, PFS:REPORT and PFS:GRAPH. Also, existing IBM and equivalent versions of the four products are compatible with the new enhanced MS-DOS versions.

Customers who purchased versions of PFS software for IBM and equivalent computers between September 1 and November 30, 1984 may receive a free update by mailing a dated sales receipt and one of the two program disks to Software Publishing. PFS owners who did not purchase their software dring this time may update IBM and equivalent computer versions by sending in one of the two program disks and $35 (plus sales tax for California residents) for each product to be updated.

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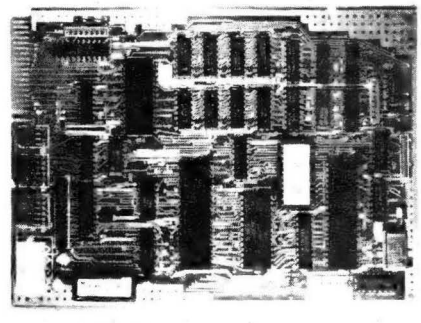

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STB Systems, Inc. now offers short slot add-on boards for the expansion needs of IBM PC users.

STB's Super I/O II and Quarter Byte are compact enough to fit in the short slots of the IBM Portable and XT as well as in any slot of the IBM PC. The Quarter Byte provides additional memory. The Super I/O II is a four function board featuring an asynchronous RS232C serial communications port, a parallel port, game port and clock/calendar.

The Super I/O II serial communications port is compatible with the IBM Asynchronous Communication adapter and provides a switchable address for compatibility with Columbia™ and other IBM compatible machines. The board is designed to interface with modems for communication over telephone lines with other computers. The Super I/O II also interfaces with serial printers for letter quality printing and with plotters for producing charts and graphs. For special software programs, the Super I/O II will interface with a mouse.

The parallel port of the Super I/O II has a switchable address and interfaces with the IBM compatible graphic printer. Since the parallel port can be configured to send and receive data, it can be connected to any SASI/SCSI hard disk controller.

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A one-year warranty and PC Accelerator™ are included with the Super I/O II. The board is available for $229.00 at participating STB Systems dealers.

STB's Quarter Byte allows for the use of larger spreadsheets and long document production with word processing. The board expands the basic memory of the IBM PC, XT and Portable to provide up to 512K of user memory. Two Quarter Bytes can be used in the IBM Portable and XT, expanding system memory to 768K. With PC Accelerator, memory above 640K in most IBM compatible systems can be used for electronic disk and/or print buffer.

A one-year warranty and PC Accelerator are included with the Quarter Byte. The board (64K expandable to 256K) is available for $259.00; the 256K for $519.00 (All prices suggested U.S. resale.)

For more information on these products contact STB Systems, Inc. 601 North Glenville Drive, Suite 125, Richardson, Texas 75081, (214) 234-8750.

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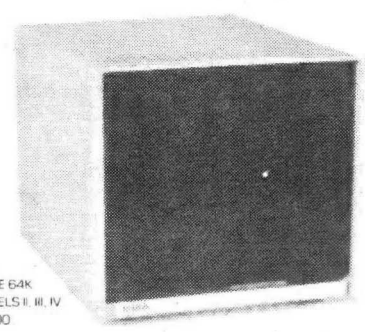

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DEC Announces Baseway, Software For Factory Automation

Digital Equipment Corporation announces BASEWAY™ software, the manufacturing industry's first software product from a major supplier designed to integrate industrial controllers with manufacturing applications.

BASEWAY software serves as the core of a computerized manufacturing environment and as a framework or 'base' for automated factory growth.

The BASEWAY product set provides plant managers, engineers, and factory floor personnel with flexible networking and applications sharing capabilities and a common user interface.

The integration of these data sources on the factory floor allows plant managers to:

- Increase productivity through prompt problem identification;
- Improve quality control;
- Expand factory automation capabilities;
- Reduce scrap and rework; and
- Reduce operating costs through more efficient communications

The BASEWAY Product Set

Today, the BASEWAY product set consists of three software components—the Shop Floor Gateway; BASEWAY Application Software Bus; and Programmable Device Support, the first available user application package. These offer expansion for the addition of new factory devices, as well as new user applications.

The Shop Floor Gateway is an intelligent hardware/software communication device, running on a PDP-11™ system, which acts as a translator between specific shop floor devices and a host computer.

The Gateway currently supports two specific communications protocols: the Allen-Bradley Data Highway and the Gould Modicon Modbus® Programmable Controller Network. The Gateway interprets data from each of these devices and packages it into a common data structure. Integration is achieved by communicating this information via DECnet™ communications to the BASEWAY Application Software Bus for use by applications such as Programmable Device Support.

Running on the VAX/VMS™ operating system, the BASEWAY Application Software Bus communicates with control devices on the shop floor and provides a common means of sharing information throughout the factory.

In addition, the BASEWAY Application Software Bus has an audit trail that tracks activities within the computer system and on the shop floor. The Application Software Bus also contains security features that protect critical factory data.

Programmable Device Support

The first of the manufacturing user applications supported by the Software Bus is the Programmable Device Support. Programmable Device Support software is a menu-driven application that is capable of uploading/downloading, reading/writing, comparing, documenting and maintaining a library of ladder logic programs.

As a foundation for future development, the open design of the BASEWAY software product set allows for the development of customized user applications, as well as the addition of new industrial device support.

Prices for the BASEWAY Product Set are: Shop Floor Gateway, $4,000; Programmable Device Support, $4,000; BASEWAY Application Software Bus, $18,000. The minimum configuration required to run the Product Set includes a VAX-11/750 computer with a VMS operating system and a PDP-11/24 minicomputer with an RSX-11S real time operating system. The BASEWAY Product Set will be available for shipping in January 1985.

For more information, contact Digital Equipment Corporation, Maynard, MA 01754.

Mention that you read it in Computer Shopper. ●

OK-Writer Firmware For The Okidata 82a Printer

by Tom Szlucha

Have you noticed that a few weeks after you purchase a major computer peripheral, like a disk drive or printer, that a new, better, perhaps less expensive model is introduced. It is almost an axiom of Murphy's law. When this happens, you may develop a certain amount of resentment for your new but outdated purchase. This can cause you to foster feelings as evil as secretly wishing for an early demise of your new equipment. This, of course, is being driven by your passion for the new product. If you have followed computer peripherals for the last several years you probably have noticed that the fastest introduction of features and turnover of models has occurred with printers. I have owned three different models in the last three years and up until a month ago, I was still years behind in the latest features. It has been about a month since I installed an ingenious upgrade to my OKIDATA 82a printer, bringing a two- to three-year-old printer technology (ancient in computer terms) back to the front of the pack. This review is about this hardware upgrade, called OK-WRITER, available for the OKI 82a and 83a printer. You will see that for the most part I am very enthusiastic about it and find it worth serious consideration.

Those of you who own an OKIDATA printer know what I mean when I say that if there were ever a war between the major printer manufacturers, OKI would win because their printers are built like tanks! No, they are not big bulky behemoths that require a special steel reinforced stand, but they are hefty, and built for continuous, day-in, day-out use. But again, the problem that many of us who purchased the OKI-82a (and 83a models) have discovered is that

Continued on page 106

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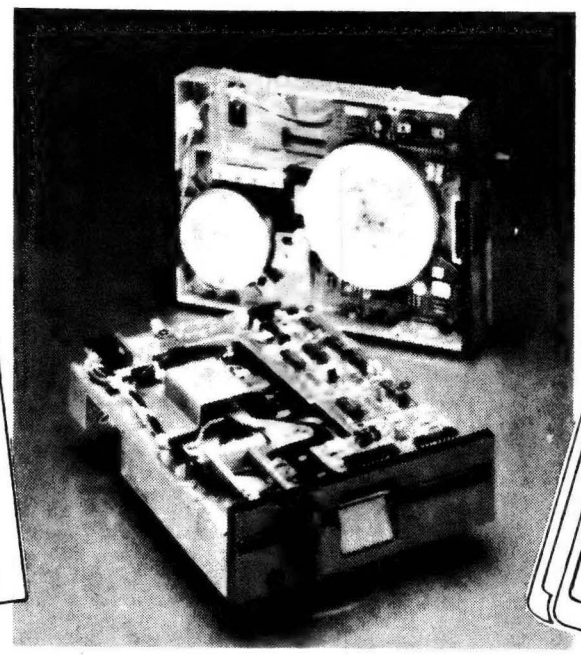

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OK-Writer

Continued from page 104

over the last few years there have been many new printers introduced which have many features not available on this OKI model. More than once, I have been seriously tempted by the new wiz bang, all plastic, almost lighter-than-air models because "near letter quality" is being redefined.

This new product is rather unique. It puts considerable life, in terms of new features, back into the old OKI. It should be noted that this product is not offered by OKIDATA. They would rather you bought their new model 92 or 93. The OK-WRITER was developed independently by a small California enterprise called Rainbow Technologies. Friendly folks who have answers to questions and are sincerely concerned about their customers needs.

What is so good about this product? The change that takes place when this firmware is installed enhances the printer to nearly the level of the new model 92 (or 93). In fact, some features are added which are not available to the 92.

This is the comparison of some of the features:

OK-WRITER is a hardware board which is installed onto the control circuit board beneath the cover of the OKI-82a. It is very easy to install—a simple matter of removing 3 existing eproms from their sockets and plugging in the very sturdy OK-WRITER board. It is designed for owner installation, being a five-minute job which requires only a screwdriver. The included installation instructions are detailed and clear.

This is a comparison of some of the major features:

	82a	OK-WRITER	92a
data quality	yes/120cps	yes/120cps	yes/160cps
near letter quality	no	yes/30cps	yes/40cps
proportional spacing	no	yes	yes
pica mode (12 cpi)	no	yes	yes
underline/bold print	no	yes	yes
block graphics	yes	no	yes
super/subscript	no	no	yes
bit graphics	optional	yes	yes
standard interface	serial/parallel	serial/parallel	parallel
standard baud rate	1200 baud	2400 baud	parallel
diagnostics mode	no	yes	no
help mode	no	yes	no
status display	no	yes	no
front panel programming	no	yes	no

As you can see from the accompanying chart, installing the upgrade into the OK-82a or 83a creates a pseudo 92 (or 93). Most important of the new feature is the availability of almost letter quality printing. This feature alone was worth the price of the upgrade to me because I was very close to purchasing a daisy wheel printer for my correspondence. No, the print quality achieved is not true letter quality, but with a good ribbon, and a decent grade of paper, the NLQ mode comes very close. How is it done? By making multiple overlapping passes, the print head which normally uses a 9x9 matrix is made to act like a 18x17 pin matrix. The second pass of the print head is made slightly offset from the first, filling in the dot pattern. This technique is not new. Low-cost printers have had this feature for some time. On many printers the results are not as effective as on the OKIDATA, probably because it takes a heavy duty model to achieve the required print head alignment repeatability. Recognize that speed is sacrificed in the NLQ mode but even then the resulting printer speed is as fast as the more expensive daisy wheel printers.

There are several features

Continued on page 115

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IBM "Selectric" typewriter/printers, useable as a typewriter also includes built-in printer solenoids and microswitches for use as an output writer or I/O terminal. Tested as a typewriter and OPERATIONAL. Formerly sold for much more!! Includes info. and schematics.

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Model #XM-351 Series. These popular monitors feature 12" diag. CRT, adj. horiz. bandwidth and scan rate up to 80 x 24, isolated power supply. 115/230 VAC operation, 50/60 Hz. "less" brightness and contrast controls. Requires composite video input (2-wire). Ready for case of your choice. Used untested. Data and schematics included.

12" "composite" input CRT: tested, oper'l — **Buy 1 Get 1 FREE** (UNTESTED MODEL)	**$44.00**
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ADDITIONAL BARGAINS! *Call for Information & Prices*

CHANGING LIST – NEW PRICES – WEEKLY

ADDS TERMINALS (Regent, Consul etc.) used, various models
Ampex DM980 80 Mg. Drives SMD I/O, oper'l
Burroughs "Ofiswnter 345 WORD PROCESSOR/MICROCOMPUTER w/Qume Printer
CDC 9762, 80 Meg Drives, on Pedestal
CDC 9766, 300 Meg DRIVES, whole, refurbished
CDC "HAWK" 9427-H DISK DRIVES, used; whole
CDC 9448 "PHOENIX" DRIVES, used; 32 Mybtes
CDC 9775, XMD 675 Mbytes DRIVES
CDC 9730 FMD 160 Mbytes, complete
Century Data M-315; 300 Meg Winchester
Craydon BANK PASSBOOK PRINTER - RS-232 input, good cond'n
Data Printer 6644 CHAIN PRINTER, Like-New
Data Printer CHAIN PRINTER 1210, 1000 1pm, operational; good cond,n
Data Printer V306-S Drum Ptr., whole
Dataproducts B-300 U/L Print Bands, New, unused, US/English/Ascii
Dataproducts Acoust. Encl. for BP-1500 Paper Stacker, New, Unused
Dataproducts 2550, CHARABAND PRINTER, operational
Dataproducts 2230, whole, used
Dataproducts 2260 600 1pm DRUM PTR
Dataproducts Electric PAPER STACKERS (used w/Hi-Speed Band Printers)
Diablo 44 Series 10 Mbyte Drives, parts available too (cheap)
Diablo 630 Daisy Printers, Whole, used
Diablo 1620, 1640, & 1650 R/O & KSR TERMINALS, refurbished, guaranteed
Facit (Dataroyal) Matrix Printers, Series 5000, ser. & para I/O operational
Fujitsu M2302B "MICRO DISK DRIVE" 8" Hi-Density, unused
GE Terminet 340, 300 LPM BAND PTRS., All I/O's, Refurb'd & g'teed
GE -2030 KSR TERMINALS
IBM "Selectric" Typewnter/Printers low profile, table top, 15" wide, USED
Imlac 8000 Mod II, 19" CAD/CAM Graphic Work Stations/Terminals (W/Tek Emulation)
Kennedy 9100 Vacuum Column TAPE DRIVES
NEC Spinwriter Model 3500, used, complete w/tractor, sheet feeder
OEM DISK DRIVE STANDS, New, Unused for CDC "Phoenix" Drives
Ontel OPR-1 KSR "SMART" TERMINALS excellent cond'n, (like new)
Pertec Model 3422 DISK DRIVES, used, whole, good cond'n
Pertec 8640-A Dual Density TAPE DRIVES, used
Pertec TAPE FORMATTERS 1600 BPI, New, unused (Phase-uncoded to 75 IPS)
Perkin-Elmer TERMINALS, excellent cond'n, (like new) Models 550 & 1200
Printronix P-300 Printer w/DPC interface
Quantum 2040 40 Mb 8" Winis, fully operational, tested, g'teed
Qume Sprint 7/55 DAISY PRINTERS w/Adapter for sheet feeder, Qume I/O, good con'd
Qume Sprint 3/55 OEM Daisy Printers, used, complete
Seagate ST-412 Winchester Drives RFE
Shugart SA-1004 10 Mbytes (WINI) DISK DRIVES, clean, whole, New & Used
Shugart 8" Drives (800 & 900 Series), untested, whole
"Tek" Daisy Printer F10-55 cps, Diablo compatible
Tektronix 4014 Graphic Terminals, good cond'n
Tektronix 4012 Graphic Terminals, good cond'n
Telex 630/40 TAPE DRIVE, used, in cabinet 1600 & 6250 BPI, untested
U-Bix Hi-speed Non-Impact PAGE PRINTER fully oper'l, Like-New, unused
Wang-Compatible (VS, OIS, WORD PROCESSING) DAISY PRINTERS (Diablo 630) new, unused
Wang OIS-130 CPU & Disk, operational
Wang 6581-W Daisy Printers, Reconditioned
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WANTED: Control Data TB-216 DRIVE EXERCISER (FTU)...(Call Debbie)...WANTED

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IBM PC with 256K RAM with 2 360K Drives	$2540.00	$2095.00	$1885.50	$1780.75
IBM PC 256K RAM w/2 drives, & 10 Megabyte hard disk system	$4995.00	$2995.00	$2695.00	$2545.75
*** **COMPAQ COMPUTER SYSTEM:**				
Compaq 256K w/2 drives, portable system	$2995.00	$2695.00	$2425.50	$2290.75
***APPLE COMPUTER				
Apple IIc 128K RAM Printer Port, Game Port 1 Drive & RS232C Serial	$1,495.00	$1,245.00	$1,120.50	$1,058.25
Apple IIe Entry System 64K RAM, 1 drive DOS, 80 Column Card	$1,595.00	$1,295.00	$1,165.50	$1,100.75
Macintosh Computer	$2,695.00	$2,395.00	$2,155.50	$2,035.75
Macintosh With Display Writer Printer	$3,395	2,945.00	$2,650.50	$2,503.25
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Yeung PC Turbo 256K RAM with 2 360K drives	$2495.00	$1795.00	$1615.50	$1525.75
Yeung PC Turbo 256K RAM w/2 drives, & 10 Mbyte hard disk system	$3695.00	$2695.00	$2425.50	$2290.75
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Epson FX-100 Printer	$850.00	$775.00	$697.50	$658.75
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*** **RAM CHIP:**				
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Computer Case for PC/XT	$150.00	$95.00	$85.50	$80.75
*** **POWER SUPPLY:**				
80W Power Supply IBM Comp.	$180.00	$160.00	$144.00	$136.00
100W Power Supply IBM Comp.	$200.00	$175.00	$157.50	$148.75
130W Power Supply IBM Comp.	$240.00	$200.00	$180.00	$170.00
150W Power Supply IBM Comp.	$280.00	$225.00	$202.50	$191.25
*** **MOTHER BOARD:**				
Yeung XT Bare Board with manual	$100.00	$75.00	$67.50	$63.75
Yeung XT 128K Mother Board	$595.00	$525.00	$472.50	$446.25
Yeung PC Turbo 128K M.B.	$696.00	$625.00	$562.50	$531.25
*** **MONITOR:**				
Dynax Amber 20MHZ Monitor	$195.00	$150.00	$135.00	$127.50
PGS HX12 Color Monitor	$595.00	$550.00	$445.00	$425.40
Taitung High Res. Color Monitor	$595.00	$465.00	$418.50	$395.00
Keytronics Keyboard 5150	$150.00	$120.00	$108.00	$102.00
Keytronics Keyboard 5151	$250.00	$225.00	$202.50	$191.25
Hi Tek Enhanced Keyboard	$175.00	$125.00	$112.50	$106.25
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Disk Combo Card (1 serial, 1 ptr port, RTC & game port)	$275.00	$225.00	$202.50	$191.25
Parallel Printer Card	$100.00	$70.00	$63.00	$59.25
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Ast I/O Plus	$185.00	$160.00	$144.00	$136.00
Ast Monographplus	$499.00	$399.00	$359.10	$339.15
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TEC DS/DD drive 360K Byte	$200.00	$140.00	$126.00	$119.00
Panasonics drive 360K Byte	$225.00	$160.00	$144.00	$136.00
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10 MB hard disk half high	$695.00	$525.00	$472.50	$446.25
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2102L-2	1024x1	(250ns)(LP)	1.45
2125	1024x1	(45ns)	2.95
2111	256x4	(450ns)	2.49
2111L	256x4	(450ns)(LP)	2.95
2112	256x4	(450ns)	2.99
2114	1024x4	(450ns)	8/9.95
2114-25	1024x4	(250ns)	8/10.95
2114L-4	1024x4	(450ns)(LP)	8/12.95
2114L-3	1024x4	(300ns)(LP)	8/13.45
2114L-2	1024x4	(200ns)(LP)	8/13.95
2114L-15	1024x4	(150ns)(LP)	8/19.95
TC5514	1024x4	(650ns)(cmos)	4.95
2141	4096x1	(200ns)	2.95
2147	4096x1	(55ns)	4.95
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TMS4044-4	4096x1	(450ns)	3.49
TMS4044-3	4096x1	(300ns)	3.99
TMS4044-2	4096x1	(200ns)	4.49
TMS40L44-2	4096x1	(200ns)(LP)	4.95
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TMM2016-150	2048x8	(150ns)	4.95
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HM6116-4	2048x8	(200ns)(cmos)	4.75
HM6116-3	2048x8	(150ns)(cmos)	4.95
HM6116-2	2048x8	(120ns)(cmos)	8.95
HM6116LP-4	2048x8	(200ns)(cmos)(LP)	5.95
HM6116LP-3	2048x8	(150ns)(cmos)(LP)	6.95
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HM6264P-15	8192x8	(150ns)(cmos)	34.95
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LP=Low power Qstat=Quasi-Static

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TMS4050	4096x1	(300ns)	1.95
UPD411	4096x1	(300ns)	1.95
TMS4060	4096x1	(300ns)	1.95
MK4108	8192x1	(200ns)	1.95
MM5298	8192x1	(250ns)	1.85
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TMS4164	65536x1	(150ns)(5v)	8.95
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5v=Single 5 Volt Supply REFRESH=Pin 1 Refresh

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2716	2048x8	(450ns)(5V)	3.95
2716-1	2048x8	(350ns)(5V)	5.95
TMS2516	2048x8	(450ns)(5V)	5.50
TMS2716	2048x8	(450ns)	7.95
TMS2532	4096x8	(450ns)(5V)	5.95
2732	4096x8	(450ns)(5V)	4.95
2732-250	4096x8	(250ns)(5V)	8.95
2732-200	4096x8	(200ns)(5V)	11.95
2732A-4	4096x8	(450ns)(5V)(21V PGM)	4.95
2732A-35	4096x8	(350ns)(5V)(21V PGM)	4.95
2732A	4096x8	(250ns)(5V)(21V PGM)	9.95
2732A-2	4096x8	(200ns)(5V)(21V PGM)	13.95
2764	8192x8	(450ns)(5V)	6.95
2764-250	8192x8	(250ns)(5V)	7.95
2764-200	8192x8	(200ns)(5V)	19.95
TMS2564	8192x8	(450ns)(5V)	14.95
MCM68764	8192x8	(450ns)(5V)(24 pin)	39.95
MCM68766	8192x8	(350ns)(5V)(24 pin)	42.95
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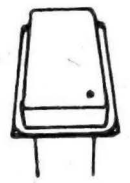

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74LS00

74LS00	.24	74LS189	8.95
74LS01	.25	74LS190	.89
74LS02	.25	74LS191	.89
74LS03	.25	74LS192	.79
74LS04	.24	74LS193	.79
74LS05	.25	74LS194	.69
74LS08	.28	74LS195	.69
74LS09	.29	74LS196	.79
74LS10	.25	74LS197	.79
74LS11	.35	74LS221	.89
74LS12	.35	74LS240	.95
74LS13	.45	74LS241	.99
74LS14	.59	74LS242	.99
74LS15	.35	74LS243	.99
74LS20	.25	74LS244	1.29
74LS21	.29	74LS245	1.49
74LS22	.25	74LS247	.75
74LS26	.29	74LS248	.99
74LS27	.29	74LS249	.99
74LS28	.35	74LS251	.59
74LS30	.25	74LS253	.59
74LS32	.29	74LS257	.59
74LS33	.55	74LS258	.59
74LS37	.35	74LS259	2.75
74LS38	.35	74LS260	.59
74LS40	.25	74LS261	2.25
74LS42	.49	74LS266	.55
74LS47	.75	74LS273	1.49
74LS48	.75	74LS275	3.35
74LS49	.75	74LS279	.49
74LS51	.25	74LS280	1.98
74LS54	.29	74LS283	.69
74LS55	.29	74LS290	.89
74LS63	1.25	74LS293	.89
74LS73	.39	74LS295	.99
74LS74	.35	74LS298	.89
74LS75	.39	74LS299	1.75
74LS76	.39	74LS322	5.95
74LS78	.49	74LS323	3.50
74LS83	.60	74LS324	1.75
74LS85	.69	74LS348	2.50
74LS86	.39	74LS352	1.29
74LS90	.55	74LS353	1.29
74LS91	.89	74LS363	1.35
74LS92	.55	74LS364	1.95
74LS93	.55	74LS365	.49
74LS95	.75	74LS366	.49
74LS96	.89	74LS367	.45
74LS107	.39	74LS368	.45
74LS109	.39	74LS373	1.39
74LS112	.39	74LS374	1.39
74LS113	.39	74LS375	.95
74LS114	.39	74LS377	1.39
74LS122	.45	74LS378	1.18
74LS123	.79	74LS379	1.35
74LS124	2.90	74LS385	3.90
74LS125	.49	74LS386	.45
74LS126	.49	74LS390	1.19
74LS132	.59	74LS393	1.19
74LS133	.59	74LS395	1.19
74LS136	.39	74LS396	1.89
74LS137	.99	74LS399	1.49
74LS138	.55	74LS424	2.95
74LS139	.55	74LS447	.95
74LS145	1.20	74LS490	1.95
74LS147	2.49	74LS540	1.95
74LS148	1.35	74LS541	1.95
74LS151	.55	74LS624	3.99
74LS153	.55	74LS640	2.20
74LS154	1.90	74LS645	2.20
74LS155	.69	74LS668	1.69
74LS156	.69	74LS669	1.89
74LS157	.65	74LS670	1.49
74LS158	.59	74LS674	14.95
74LS160	.69	74LS682	3.20
74LS161	.65	74LS683	3.20
74LS162	.69	74LS684	3.20
74LS163	.65	74LS685	3.20
74LS164	.69	74LS688	2.40
74LS165	.95	74LS689	3.20
74LS166	1.95	81LS95	1.49
74LS168	1.75	81LS96	1.49
74LS169	1.75	25LS2518	4.13
74LS170	1.49	25LS2521	2.80
74LS173	.69	25LS2538	3.74
74LS174	.55	25LS2569	2.80
74LS175	.55	26LS31	2.19
74LS181	2.15	26LS32	2.19

Z-80

2.5 MHz

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Z80-CTC	3.95
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4.0 MHz

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6.0 MHz

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Z80B-SIO/0	29.95
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6500

1.0 MHz

6502	4.95
65C02(CMOS)	12.95
6504	6.95
6505	8.95
6507	9.95
6520	4.35
6522	6.95
6532	9.95
6545	22.50
6551	11.85

2.0 MHz

6502A	6.95
6522A	9.95
6523A	11.95
6545A	27.95
6551A	11.95

3.0 MHz

6502B	9.95

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2350	9.95
2651	8.95
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IM6403	8.95
UPD7201	19.95
INS8520	10.95

6800

68000-8	49.95
6800	2.95
6802	7.95
6803	19.95
6808	13.90
6809E	14.95
6809	11.95
6810	2.95
6820	4.35
6821	2.95
6828	14.95
6840	12.95
6843	34.95
6844	25.95
6845	12.95
6847	11.95
6850	3.25
6852	5.75
6860	7.95
6875	6.95
6880	2.25
6883	22.95
68047	24.95
68488	19.95

6800=1 MHz

68B00	10.95
68B02	22.95
68B09E	29.95
68B09	29.95
68B10	6.95
68B21	6.95
68B40	19.95
68B45	19.95
68B50	5.95

68B00=2 MHz

8000

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8200

8202	24.95
8203	39.95
8205	3.50
8212	1.80
8214	3.85
8216	1.75
8224	2.25
8226	1.80
8228	3.49
8237	19.95
8237-5	21.95
8238	4.49
8243	4.45
8250	10.95
8251	4.49
8253	6.95
8253-5	7.95
8255	4.49
8255-5	5.25
8257	7.95
8257-5	8.95
8259	6.90
8259-5	7.50
8271	79.95
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8275	29.95
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74S00	.32	74S135	.89	74S244	2.20
74S02	.35	74S138	.85	74S251	.95
74S03	.35	74S139	.85	74S253	.95
74S04	.35	74S140	.55	74S257	.95
74S05	.35	74S151	.95	74S258	.95
74S08	.35	74S153	.95	74S260	.79
74S09	.40	74S157	.95	74S273	2.45
74S10	.35	74S158	.95	74S274	19.95
74S11	.35	74S161	1.95	74S275	19.95
74S15	.35	74S162	1.95	74S280	1.95
74S20	.35	74S163	1.95	74S283	3.29
74S22	.35	74S168	3.95	74S287	1.90
74S30	.35	74S169	3.95	74S288	1.90
74S32	.40	74S174	.95	74S289	6.98
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74S38	.85	74S180	11.95	74S301	6.95
74S40	.35	74S181	3.95	74S373	2.45
74S51	.35	74S182	2.95	74S374	2.45
74S64	.40	74S185	16.95	74S381	7.95
74S65	.40	74S188	1.95	74S387	1.95
74S74	.50	74S189	6.95	74S399	2.95
74S85	1.99	74S194	1.49	74S412	2.98
74S86	.50	74S195	1.49	74S470	6.95
74S112	.50	74S196	1.49	74S471	4.95
74S113	.50	74S197	1.49	74S472	4.95
74S114	.55	74S201	6.95	74S474	4.95
74S124	2.75	74S225	7.95	74S570	2.95
74S132	1.24	74S226	3.99	74S571	2.95
74S133	.45	74S240	2.20	74S573	9.95
74S134	.50	74S241	2.20	87S181	16.25
				87S185	16.95

7400

7400	.19	7483	.50	74172	5.95
7401	.19	7485	.59	74173	.75
7402	.19	7486	.35	74174	.89
7403	.19	7489	2.15	74175	.89
7404	.19	7490	.35	74176	.89
7405	.25	7491	.40	74177	.75
7406	.29	7492	.50	74178	1.15
7407	.29	7493	.35	74179	1.75
7408	.24	7494	.65	74180	.75
7409	.19	7495	.55	74181	2.25
7410	.19	7496	.70	74182	.75
7411	.25	7497	2.75	74184	2.00
7412	.30	74100	1.75	74185	2.00
7413	.35	74105	1.14	74189	2.99
7414	.49	74107	.30	74190	1.15
7416	.25	74109	.45	74191	1.15
7417	.25	74110	.45	74192	.79
7420	.19	74111	.55	74193	.79
7421	.35	74116	1.55	74194	.85
7422	.35	74120	1.20	74195	.85
7423	.29	74121	.29	74196	.79
7425	.29	74122	.45	74197	.75
7426	.29	74123	.49	74198	1.35
7427	.29	74125	.45	74199	1.35
7428	.45	74126	.45	74221	1.35
7430	.19	74128	.55	74246	1.35
7432	.29	74132	.45	74247	1.25
7433	.45	74136	.50	74248	1.85
7437	.29	74141	.65	74249	1.95
7438	.29	74142	2.95	74251	.75
7439	.79	74143	4.95	74259	2.25
7440	.19	74144	2.95	74265	1.35
7442	.49	74145	.60	74273	1.95
7443	.65	74147	1.75	74276	1.25
7444	.69	74148	1.20	74278	3.11
7445	.69	74150	1.35	74279	.75
7446	.69	74151	.55	74283	2.00
7447	.69	74152	.65	74284	3.75
7448	.69	74153	.55	74285	3.75
7450	.19	74154	1.25	74290	.95
7451	.23	74155	.75	74293	.75
7453	.23	74156	.65	74298	.85
7454	.23	74157	.55	74351	2.25
7460	.23	74159	1.65	74365	.65
7470	.35	74160	.85	74366	.65
7472	.29	74161	.69	74367	.65
7473	.34	74162	.85	74368	.65
7474	.33	74163	.69	74376	2.20
7475	.45	74164	.85	74390	1.75
7476	.35	74165	.85	74393	1.35
7480	.59	74166	1.00	74425	3.15
7481	1.10	74167	2.96	74426	.85
7482	.95	74170	1.65	74490	2.55

CMOS

4000	.29	4532	1.95
4001	.25	4538	1.95
4002	.25	4539	1.95
4006	.89	4541	2.64
4007	.29	4543	1.19
4008	.95	4553	5.79
4009	.39	4555	.95
4010	.45	4556	.95
4011	.25	4558	2.45
4012	.25	4560	4.25
4013	.38	4569	3.49
4014	.79	4581	1.95
4015	.39	4582	1.95
4016	.39	4584	.75
4017	.69	4585	.75
4018	.79	45151	12.95
4019	.39	4702	12.95
4020	.75	4724	1.50
4021	.79	74C00	.35
4022	.79	74C02	.35
4023	.29	74C04	.35
4024	.65	74C08	.35
4025	.29	74C10	.35
4026	1.65	74C14	.59
4027	.45	74C20	.35
4028	.69	74C30	.35
4029	.79	74C32	.39
4030	.39	74C42	1.29
4034	1.95	74C48	1.99
4035	.85	74C73	.65
4040	.75	74C74	.65
4041	.75	74C76	.80
4042	.69	74C83	1.95
4043	.85	74C85	1.95
4044	.79	74C86	.39
4046	.85	74C89	4.50
4047	.95	74C90	1.19
4048	.69	74C93	1.75
4049	.35	74C95	.99
4050	.35	74C150	5.75
4051	.79	74C151	2.25
4052	1.99	74C154	3.25
4053	.79	74C157	1.75
4060	.89	74C160	1.19
4066	.39	74C161	1.19
4068	.39	74C162	1.19
4069	.29	74C163	1.19
4070	.35	74C164	1.39
4071	.29	74C165	2.00
4072	.29	74C173	.79
4073	.29	74C174	1.19
4075	.29	74C175	1.19
4076	.79	74C192	1.49
4077	.59	74C193	1.49
4078	.29	74C195	1.39
4081	.29	74C200	5.75
4082	.29	74C221	1.75
4085	.95	74C224	2.25
4086	.95	74C373	2.45
4093	.49	74C374	2.45
4094	2.99	74C901	.39
4098	2.49	74C902	.85
4099	1.95	74C903	.85
14409	12.95	74C905	10.95
14410	12.95	74C906	.95
14411	11.95	74C907	1.00
14412	12.95	74C908	2.00
14419	7.95	74C909	2.75
14433	14.95	74C910	9.95
4502	.95	74C911	8.95
4503	.65	74C912	8.95
4507	1.25	74C914	1.95
4508	1.95	74C915	1.19
4510	.85	74C918	2.75
4511	.85	74C920	17.95
4512	.85	74C921	15.95
4514	1.25	74C922	4.49
4515	1.79	74C923	4.95
4516	1.55	74C925	5.95
4518	.89	74C926	7.95
4519	.39	74C927	7.95
4520	.79	74C928	7.95
4521	4.99	74C929	19.95
4522	1.25	74C930	4.95
4526	1.25	80C95	.85
4527	1.95	80C96	.95
4528	1.19	80C97	.95
4529	2.95	80C98	1.20
4531	.95		

HIGH SPEED CMOS

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74HC00

74HC: Operate at CMOS logic levels and are ideal for new, all-CMOS designs.

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74HC02	.59	74HC193	1.25
74HC04	.59	74HC194	1.04
74HC08	.59	74HC195	1.09
74HC10	.59	74HC238	1.35
74HC11	.59	74HC240	1.89
74HC14	.79	74HC241	1.89
74HC20	.59	74HC242	1.89
74HC27	.59	74HC243	1.89
74HC30	.59	74HC244	1.89
74HC32	.69	74HC245	1.89
74HC51	.59	74HC251	.89
74HC74	.75	74HC257	.85
74HC75	.85	74HC259	1.39
74HC85	1.35	74HC273	1.89
74HC86	.69	74HC299	4.99
74HC93	1.19	74HC367	.99
74HC125	1.19	74HC373	2.29
74HC132	1.19	74HC374	2.29
74HC138	.99	74HC393	1.39
74HC139	.99	74HC4017	1.99
74HC151	.89	74HC4020	1.39
74HC153	.89	74HC4024	1.59
74HC154	2.49	74HC4040	1.39
74HC157	.89	74HC4049	.89
74HC161	1.15	74HC4050	.89
74HC164	1.25	74HC4060	1.29
74HC166	2.95	74HC4511	2.39
74HC174	.99	74HC4538	2.29

74HCT00

74HCT: Direct, drop-in replacements for LS TTL and can be intermixed with 74LS in the same circuit.

74HCT00	.69	74HCT175	1.09
74HCT02	.69	74HCT193	1.39
74HCT04	.69	74HCT194	1.19
74HCT08	.69	74HCT195	1.29
74HCT10	.69	74HCT238	1.49
74HCT11	.69	74HCT240	2.19
74HCT14	.89	74HCT241	2.19
74HCT20	.69	74HCT242	2.19
74HCT27	.69	74HCT243	2.19
74HCT30	.69	74HCT244	2.19
74HCT32	.79	74HCT245	2.19
74HCT51	.69	74HCT251	1.09
74HCT74	.85	74HCT257	.99
74HCT75	.95	74HCT259	1.59
74HCT85	1.49	74HCT273	2.09
74HCT86	.79	74HCT299	5.25
74HCT93	1.29	74HCT367	1.09
74HCT125	1.29	74HCT373	2.49
74HCT132	1.29	74HCT374	2.49
74HCT138	1.15	74HCT393	1.59
74HCT139	1.15	74HCT4017	2.19
74HCT151	1.05	74HCT4020	1.59
74HCT153	1.05	74HCT4024	1.79
74HCT154	2.99	74HCT4040	1.59
74HCT157	.99	74HCT4049	.99
74HCT161	1.29	74HCT4050	.99
74HCT164	1.39	74HCT4060	1.49
74HCT166	3.05	74HCT4511	2.69
74HCT174	1.09	74HCT4538	2.59

VOLTAGE REGULATORS

TO-220 CASE PACKAGE

7805T	.75	7905T	.85
7808T	.75	7908T	.85
7812T	.75	7912T	.85
7815T	.75	7915T	.85
7824T	.75	7924T	.85

TO-3 CASE PACKAGE

7805K	1.39	7905K	1.49
7812K	1.39	7912K	1.49
7815K	1.39	7915K	1.49
7824K	1.39	7924K	1.49

TO-92 CASE PACKAGE

78L05	.69	79L05	.79
78L12	.69	79L12	.79
78L15	.69	79L15	.79

OTHER VOLTAGE REGS

78M05C	5volt	½amp	TO-220	.35
LM323K	5volt	3amp	TO-3	4.95
LM338K	Adj.	5amp	TO-3	3.95
78H05K	5volt	5amp	TO-3	9.95
78H12K	12volt	5amp	TO-3	9.95
78P05K	5volt	10amp	TO-3	14.95
UA78S40	FAIRCHILD		DIP	1.95

LINEAR

LM301	.34	LM567	.89
LM301H	.79	NE570	3.95
LM307	.45	NE571	2.95
LM308	.69	NE590	2.50
LM308H	1.15	NE592	.98
LM309H	1.95	LM709	.59
LM309K	1.25	LM710	.75
LM310	1.75	LM711	.79
LM311	.64	LM723	.49
LM311H	.89	LM723H	.55
LM312H	1.75	LM733	.98
LM317K	3.95	LM741	.35
LM317T	1.19	LM741N-14	.35
LM318	1.49	LM741H	.40
LM318H	1.59	LM747	.69
LM319H	1.90	LM748	.59
LM319	1.25	LM1014	1.19
LM320	see7900	LM1303	1.95
LM322	1.65	LM1310	1.49
LM323K	4.95	MC1330	1.69
LM324	.59	MC1349	1.89
LM329	.65	MC1350	1.19
LM331	3.95	MC1358	1.69
LM334	1.19	MC1372	6.95
LM335	1.40	LM1414	1.59
LM336	1.75	LM1458	.59
LM337T	1.95	LM1488	.69
LM337K	3.95	LM1489	.69
LM338K	3.95	LM1496	.85
LM339	.99	LM1558H	3.10
LM340	see7800	LM1800	2.37
LM348K	.99	LM1812	8.25
LM350K	4.95	LM1830	3.50
LM350T	4.60	LM1871	5.49
LM358	.69	LM1872	5.49
LM359	1.79	LM1877	3.52
LM376	3.75	LM1889	1.95
LM377	1.95	LM1896	1.75
LM378	2.50	ULN2003	2.49
LM379	4.50	LM2877	2.05
LM380	.89	LM2878	2.25
LM380N-8	1.10	LM2900	.85
LM381	1.60	LM2901	1.00
LM382	1.60	MPQ2907	1.95
LM383	1.95	LM2917	2.95
LM384	1.95	LM3900	.59
LM386	.89	LM3905	1.25
LM387	1.40	LM3909	.98
LM389	1.35	LM3911	2.25
LM390	1.95	LM3914	3.95
LM392	.69	LM3915	3.95
LM393	1.29	LM3916	3.95
LM394H	4.60	MC4024	3.95
LM399H	5.00	MC4044	4.50
NE531	2.95	RC4136	1.25
NE555	.34	RC4151	3.95
NE556	.65	LM4250	1.75
NE558	1.50	LM4500	3.25
NE564	2.95	RC4558	.69
LM565	.99	LM13600	1.49
LM566	1.49	LM13700	1.45

H=TO-5 CAN, K=TO-3, T=TO-220

RCA

CA3023	2.75	CA3083	1.55
CA3039	1.29	CA3086	.80
CA3046	1.25	CA3089	2.99
CA3059	2.90	CA3096	3.49
CA3060	2.90	CA3130	1.30
CA3065	1.75	CA3140	1.15
CA3080	1.10	CA3146	1.85
CA3081	1.65	CA3160	1.19
CA3082	1.65	CA3183	.99

TI

TL494	4.20	75365	1.95
TL496	1.65	75450	.59
TL497	3.25	75451	.39
75107	1.49	75452	.39
75108	1.49	75453	.39
75110	1.95	75454	.39
75150	1.95	75491	.79
75154	1.95	75492	.79
75188	1.25	75493	.89
75189	1.25	75494	.89

BI FET

TL066	.99	LF347	2.19
TL071	.79	LF351	.60
TL072	1.19	LF353	1.00
TL074	2.19	LF355	1.10
TL081	.79	LF356	1.10
TL082	1.19	LF357	1.40
TL083	1.19	LF411	1.29
TL084	2.19	LF412	1.99

SPECTRONICS CORPORATION

EPROM ERASERS

	Timer	Capacity Chip	Intensity (uW/Cm²)	
PE-14		9	8,000	$83.00
PE-14T	x	9	8,000	$119.00
PE-24T	x	12	9,600	$175.00
PL-265T	x	30	9,600	$255.00
PR-125T	x	25	17,000	$349.00
PR-320T	x	42	17,000	$595.00

TRANSISTORS

2N918	.50	2N3772	1.85
MPS918	.25	2N3903	.25
2N2102	.75	2N3904	.10
2N2218	.50	2N3906	.10
2N2218A	.50	2N4122	.25
2N2219	.50	2N4123	.25
2N2219A	.50	2N4249	.25
2N2222	.25	2N4304	.75
PN2222	.10	2N4401	.25
MPS2369	.25	2N4402	.25
2N2484	.25	2N4403	.25
2N2905	.50	2N4857	1.00
2N2907	.25	PN4916	.25
PN2907	1.25	2N5086	.25
2N3055	.79	PN5129	.25
3055T	.69	PN5139	.25
2N3393	.30	2N5209	.25
2N3414	.25	2N6028	.35
2N3563	.40	2N6043	1.75
2N3565	.40	2N6045	1.75
PN3565	.25	MPS-A05	.25
MPS3638	.25	MPS-A06	.25
MPS3640	.25	MPS-A13	.40
PN3643	.25	MPS-A55	.25
PN3644	.25	MPU-131	.99
MPS3704	.15	TIP29	.65
MPS3706	.15	TIP31	.75
		TIP32	.79

IC SOCKETS

	1-99	100
8 PIN ST	.13	.11
14 PIN ST	.15	.12
16 PIN ST	.17	.13
18 PIN ST	.20	.18
20 PIN ST	.29	.27
22 PIN ST	.30	.27
24 PIN ST	.30	.27
28 PIN ST	.40	.32
40 PIN ST	.49	.39
64 PIN ST	4.25	CALL

ST=SOLDERTAIL

8 PIN WW	.59	.49
14 PIN WW	.69	.52
16 PIN WW	.69	.58
18 PIN WW	.99	.90
20 PIN WW	1.09	.98
22 PIN WW	1.39	1.28
24 PIN WW	1.49	1.35
28 PIN WW	1.69	1.49
40 PIN WW	1.99	1.80

WW=WIREWRAP

INTERFACE

8T26	1.59
8T28	1.98
8T95	.89
8T96	.89
8T97	.89
8T98	.89
DM8131	2.95
DP8304	2.29
DS8833	2.25
DS8835	1.99
DS8836	.99
DS8837	1.65
DS8838	1.30

INTERSIL

ICL7106	9.95
ICL7107	12.95
ICL7660	2.95
ICL8038	3.95
ICM7207A	5.59
ICM7208	15.95

DATA AQC

ADC0800	15.55
ADC0804	3.49
ADC0809	4.49
ADC0816	14.95
ADC0817	9.95
ADC0831	8.95
DAC0800	4.49
DAC0806	1.95
DAC0808	2.95
DAC1020	8.25
DAC1021	7.95
DAC1022	5.95
MC1408L6	1.95
MC1408L8	2.95

EXAR

XR2206	3.75
XR2207	3.75
XR2208	3.75
XR2211	5.25
XR2240	3.25

9000

9304	.95
9316	1.00
9328	1.49
9334	2.50
9368	3.95
9401	9.95
9601	.75
9602	1.50
9637	2.95
96S02	1.95

SOUND CHIPS

76477	3.95
76488	5.95
76489	8.95
SSI-263	39.95
AY3-8910	12.95
AY3-8912	12.95
MC3340	1.49
SP1000	39.00

OPTO-ISOLATORS

4N26	1.00	MCA-7	4.25
4N27	1.10	MCA-225	1.75
4N28	.69	IL-1	1.25
4N33	1.75	ILA-30	1.25
4N35	1.25	ILQ-74	2.75
4N37	1.25	H11C5	1.25
MCT-2	1.00	TIL-111	1.00
MCT-6	1.50	TIL-113	1.75

Your friends at JDR would like to wish you and your family a pleasant holiday season, and a prosperous New Year.

VISA MasterCard

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27128 16Kx8 EPROM 250ns 24.95

4116 16K DYNAMIC 250ns 8/7.95

BARGAIN HUNTERS CORNER

2 LEVEL WIRE WRAP SOCKETS

THESE SOCKETS HAVE .50" LEADS, JUST A LITTLE SHORTER THAN THE STANDARD 2 LEVEL WIRE WRAP SOCKETS WITH .62" LEADS

	1-99	100-UP
8 PIN WW-2	.40	.35
14 PIN WW-2	.45	.39
16 PIN WW-2	.45	.39
20 PIN WW-2	.75	.59
22 PIN WW-2	.50	.39
24 PIN WW-2	.80	.75
28 PIN WW-2	.75	.75
40 PIN WW-2	.99	.89

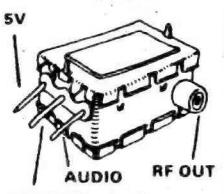
SPECIALS END 1/31/85

RF MODULATOR (ASTEC UM1082)

QUANTITIES LIMITED

- PRESET TO CHANNEL 3
- USE TO BUILD TV-COMPUTER INTERFACE
- +5 VOLT OPERATION

$6.95



EMI FILTER

- MFG BY CORONA
- LOW COST
- FITS LC-HP BELOW

$4.95

LINE CORDS

LC-2	2 CONDUCTOR	6 ft	.39
LC-3	3 CONDUCTOR	6 ft	.99
LC-HP	3 CONDUCTOR WITH STANDARD FEMALE SOCKET	6 ft	1.49
LC-CIR	CIGARETTE LIGHTER PLUG WITH 6 ft COILED CORD		2.95

MUFFIN FANS

4.68" SQUARE	14.95
3.125" SQUARE	14.95

CAPACITORS

TANTALUM

1.0µf	15V	.40	.47µf	35V	.50
6.8	15V	.70	1.0	35V	.45
10	15V	.80	2.2	35V	.65
22	15V	1.35	4.7	35V	.85
.22	35V	.40	10	35V	1.00

DISC

10pf	50V	.05	560	50V	.05
22	50V	.05	680	50V	.05
25	50V	.05	820	50V	.05
27	50V	.05	.001µf	50V	.05
33	50V	.05	.0015	50V	.05
47	50V	.05	.0022	50V	.05
56	50V	.05	.005	50V	.05
68	50V	.05	.01	50V	.07
82	50V	.05	.02	50V	.07
100	50V	.05	.05	50V	.07
220	50V	.05	.1	12V	.10

MONOLITHIC

.01µf	50V	.14	.1µf	50V	.18
.047µf	50V	.15	.47µf	50V	.25

ELECTROLYTIC

RADIAL			AXIAL		
1µf	25V	.14	1µf	50V	.14
2.2	35V	.15	4.7	16V	.14
4.7	50V	.15	10	16V	.14
10	50V	.15	10	50V	.16
47	35V	.18	22	16V	.14
100	16V	.18	47	50V	.20
220	35V	.20	100	15V	.20
470	25V	.30	100	35V	.25
2200	16V	.60	220	25V	.30
			330	16V	.40
COMPUTER GRADE			550	16V	.42
			1000	16V	.60
			2200	16V	.70
44,000µf 30V 3.95			6000	16V	.85

RESISTORS

¼ WATT 5% CARBON FILM
ALL STANDARD VALUES
FROM 1 OHM TO 10 MEG OHM

50 PIECES SAME VALUE	.025
100 PIECES SAME VALUE	.02
1000 PIECES SAME VALUE	.015

BYPASS CAPS

.01 µf DISC	100/$6.00
.01 µf MONOLITHIC	100/$12.00
.1 µf DISC	100/$8.00
.1 µf MONOLITHIC	100/$15.00

DIODES

1N751	5.1 VOLT ZENER	.25
1N759	12.0 VOLT ZENER	.25
1N4148	(1N914)SWITCHING	25/1.00
1N4001	50PIV 1A	12/1.00
1N4004	400PIV RECTIFIER	10/1.00
1N5402	200PIV 3A	.25
KBP02	200PIV 1.5A BRIDGE	.45
KBP04	400PIV 1.5A BRIDGE	.55
MDA801	50PIV 12A BRIDGE	1.39
MDA980-1	50PIV 12A BRIDGE	1.95
MDA980-2	100PIV 12A BRIDGE	2.25
VM48	DIP-BRIDGE	.35

LED DISPLAYS

HP5082-7760	CC	.43"	1.29
MAN-72	CA	.3"	.99
MAN-74	CC	.3"	.99
FND-537(359)	CC	.375"	1.25
FND-500(503)	CC	.5"	1.49
FND-507(510)	CA	.5"	1.49
TIL-311 4x7 HEX W/LOGIC		.270"	9.95

DIFFUSED LEDS

		1-99	100-up
JUMBO RED	T1¾	.10	.09
JUMBO GREEN	T1¾	.10	.09
JUMBO YELLOW	T1¾	.18	.15
MOUNTING HDW	T1¾	.10	.09
MINI RED	T1	.10	.09
MINI GREEN	T1	.18	.15
MINI YELLOW	T1	.18	.15
RECT RED	2x5mm	.25	.22
RECT GREEN	2x5mm	.30	.27
RECT YELLOW	2x5mm	.30	.27

HARD TO FIND "SNAPABLE" HEADERS

Can easily be snapped apart to make any size header, all with .1" centers

1x36	STRAIGHT LEAD	.99
2x40	STRAIGHT LEAD	2.49
2x40	RIGHT ANGLE	2.99

SHORTING BLOCKS

SPACED AT .1" CENTERS
IDEAL FOR DISK DRIVES
OR ANY .1" HEADER

5/1.00

DIP SWITCHES

4 POSITION	.85
5 POSITION	.90
6 POSITION	.90
7 POSITION	.95
8 POSITION	.95
10 POSITION	1.29

EDGECARD CONNECTORS

S-100 ST	3.95
S-100 WW	4.95
72 PIN ST	6.95
72 PIN WW	7.95
62 PIN ST	4.95
50 PIN ST	4.95
44 PIN ST	2.95
44 PIN WW	4.95

36 PIN CENTRONICS

IDCEN36	RIBBON CABLE MALE	8.95
IDCEN36/F	RIBBON CABLE FEMALE	8.95
CEN36	SOLDER CUP MALE	7.95

DIP CONNECTORS

DESCRIPTION	ORDER BY	CONTACTS								
		8	14	16	18	20	22	24	28	40
HIGH RELIABILITY TOOLED ST IC SOCKETS	AUGATxxST	.99	.99	.99	1.69	1.89	1.89	1.99	2.49	2.99
HIGH RELIABILITY TOOLED WW IC SOCKETS	AUGATxxWW	1.30	1.80	2.10	2.40	2.50	2.90	3.15	3.70	5.40
COMPONENT CARRIES (DIP HEADERS)	ICCxx	.65	.75	.85	1.00	1.25	1.25	1.35	1.50	2.10
RIBBON CABLE DIP PLUGS (IDC)	IDPxx	---	1.45	1.65	---	---	---	2.50	---	4.15

FOR ORDERING INSTRUCTIONS SEE IDC CONNECTORS BELOW

HEAT SINKS

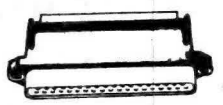
TO-220	SCREW ON	.35
TO-220	CLIP ON	.35
TO-3	SCREW ON	.95
TO-220	INSULATOR	10/1.00
TO-3	INSULATOR	10/1.00

SWITCHES

SPDT	MINI-TOGGLE ON-ON	1.25
DPDT	MINI-TOGGLE ON-ON	1.50
DPDT	MINI-TOGGLE ON-OFF-ON	1.75
SPST	MINI-PUSHBUTTON N.O.	.39
SPST	MINI-PUSHBUTTON N.C.	.39
BCD OUT 10 POSITION 6 PIN DIP		1.95

D-SUBMINIATURE

DESCRIPTION		ORDER BY	CONTACTS				
			9	15	25	37	50
SOLDER CUP	MALE	DBxxP	2.08	2.69	2.50	4.80	6.06
	FEMALE	DBxxS	2.66	3.63	3.25	7.11	9.24
RIGHTANGLE PC SOLDER	MALE	DBxxPR	1.65	2.20	3.00	4.83	---
	FEMALE	DBxxSR	2.18	3.03	4.42	6.19	---
WIRE WRAP	MALE	DBxxPWW	1.69	2.56	3.89	5.60	---
	FEMALE	DBxxSWW	2.76	4.27	6.84	9.95	---
IDC RIBBON CABLE	MALE	IDBxxP	3.37	4.70	6.23	9.22	---
	FEMALE	IDBxxS	3.69	5.13	6.84	10.08	---
HOODS	BLACK	HOOD-B	---	---	1.25	---	---
	GREY	HOOD	1.60	1.60	1.25	2.95	3.50



IDB37S

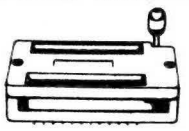
DB37S

MOUNTING HARDWARE-$1.00

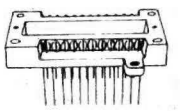
FOR ORDERING INSTRUCTIONS SEE IDC CONNECTORS BELOW

TEXTOOL ZERO INSERTION FORCE SOCKETS AND RECEPTICLES

SCREWDRIVER CLAMP ECONO ZIF



LEVER CLAMP ZIF SOCKET



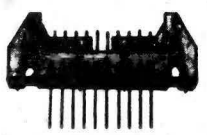
WW RECEPTICLES ZIF RECEPTICLE

TYPE	CONTACTS				
	14	16	24	28	40
ECONO ZIF	---	4.95	6.75	7.75	9.95
ZIF SOCKET	5.95	5.95	7.95	8.95	10.95
ZIF RECEPTICLE	8.25	8.75	9.75	10.50	12.75

IDC CONNECTORS

DESCRIPTION	ORDER BY	CONTACTS					
		10	20	26	34	40	50
SOLDER HEADER	IDHxxS	.82	1.29	1.68	2.20	2.58	3.24
RIGHT ANGLE SOLDER HEADER	IDHxxSR	.85	1.35	1.76	2.31	2.72	3.39
WW HEADER	IDHxxW	1.86	2.98	3.84	4.50	5.28	6.63
RIGHT ANGLE WW HEADER	IDHxxWR	2.05	3.28	4.22	4.45	4.80	7.30
RIBBON HEADER SOCKET	IDSxx	1.15	1.86	2.43	3.15	3.73	4.65
RIBBON HEADER	IDMxx	---	5.50	6.25	7.00	7.50	8.50
RIBBON EDGE CARD	IDExx	2.25	2.36	2.65	3.25	3.80	4.74

ORDERING INSTUCTIONS: INSERT THE NUMBER OF CONTACTS IN THE POSITION MARKED "xx" OF THE "ORDER BY" PART NUMBER LISTED. EXAMPLE: A 10 PIN RIGHT ANGLE HOLDER STYLE WOULD BE IDH10SR



IDH20WR

IDE50

RIBBON CABLE

CONTACTS	SINGLE COLOR		COLOR CODED	
	1'	10'	1'	10'
10	.50	4.40	.83	7.30
16	.55	4.80	1.00	8.80
20	.65	5.70	1.25	11.00
25	.75	6.60	1.32	11.60
26	.75	6.60	1.32	11.60
34	.98	8.60	1.65	14.50
40	1.32	11.60	1.92	16.80
50	1.38	12.10	2.50	22.00

VISIT OUR NEW, EXPANDED RETAIL STORE AT 1256 SOUTH BASCOM IN SAN JOSE

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PLEASE USE YOUR CUSTOMER NUMBER WHEN ORDERING

TERMS: Minimum order $10. For shipping and handling include $2.50 for UPS Ground and $3.50 for UPS Air. Orders over 1 lb. and foreign orders may require additional shipping charges - please contact our sales department for the amount. CA residents must include 6% sales tax. Bay Area and LA residents include 6½%. Prices subject to change without notice. We are not responsible for typographical errors. We reserve the right to limit quantities and to substitute manufacturer. All merchandise subject to prior sale.

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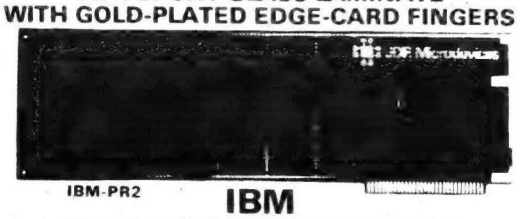
HM6116-4 2Kx8 STATIC cmos 200ns **4.75**

2732 4Kx8 EPROM 450ns **4.95**

WIRE WRAP PROTOTYPE CARDS

FR-4 EPOXY GLASS LAMINATE WITH GOLD-PLATED EDGE-CARD FINGERS



IBM-PR2

IBM

BOTH CARDS HAVE SILK SCREENED LEGENDS AND INCLUDES MOUNTING BRACKET

IBM-PR1	WITH +5V AND GROUND PLANE	$27.95
IBM-PR2	AS ABOVE WITH DECODING CIRCUITRY	$29.95

S-100

P100-1	BARE - NO FOIL PADS	$15.15
P100-2	HORIZONTAL BUS	$21.80
P100-3	VERTICAL BUS	$21.80
P100-4	SINGLE FOIL PADS PER HOLE	$22.75

APPLE

P500-1	BARE - NO FOIL PADS	$15.15
P500-3	HORIZONTAL BUS	$22.75
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7060-45	FOR APPLE IIe AUX SLOT	$30.00

GENERAL PURPOSE

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P442-1	BARE - NO FOIL PADS 4.5" x 9.0"	$10.40
P442-3	VERTICAL BUS 4.5" x 9.0"	$14.20
P442-4	SINGLE FOIL PADS 4.5" x 9.0"	$13.50

36/72 PIN EDGE-CARD (.1" SPACING)

P721-1	BARE - NO FOIL PADS 4.5" x 6.0"	$9.45
P721-3	VERTICAL BUS 4.5" x 6.0"	$13.25
P721-4	SINGLE FOIL PADS 4.5" x 6.0"	$14.20
P722-1	BARE - NO FOIL PADS 4.5" x 9.0"	$10.40
P722-3	VERTICAL BUS 4.5" x 9.0"	$14.20
P722-4	SINGLE FOIL PADS 4.5" x 9.0"	$15.15

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TEAC FD-55B

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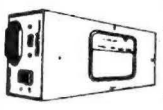

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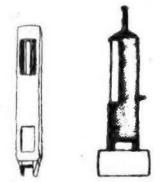
MOS series insertion tools have metal constuction and include grounding lug for CMOS applications.



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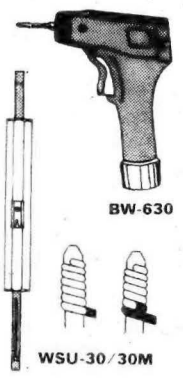

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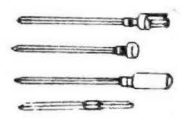

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- IDENTIFIES PIN NUMBERS ON WRAP SIDE OF BOARD
- CAN WRITE ON PLASTIC; SUCH AS IC #

PINS	PART#	PCK. OF	PRICE
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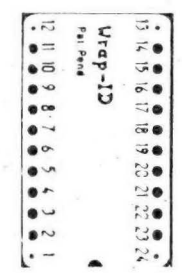
14	IDWRAP 14	10	1.95
16	IDWRAP 16	10	1.95
18	IDWRAP 18	5	1.95
20	IDWRAP 20	5	1.95
22	IDWRAP 22	5	1.95
24	IDWRAP 24	5	1.95
28	IDWRAP 28	5	1.95
40	IDWRAP 40	5	1.95

PLEASE ORDER BY NUMBER OF PACKAGES (PCK. OF)



WIRE WRAP WIRE

PRECUT AND STRIPPED

Note: 1 inch of insulation is stripped on each end. A 3.5" wire has only 1.5" of insulation.

LENGTH (INCHES)	QUANTITY 100	500	1000
2.5	1.60	4.70	8.20
3	1.60	4.70	8.20
3.5	1.65	5.00	8.90
4	1.75	5.40	9.60
4.5	1.80	5.75	10.30
5	1.85	6.10	11.00
5.5	1.90	6.50	11.75
6	2.00	6.85	12.50
6.5	2.30	7.80	14.30
7	2.40	8.20	15.05
7.5	2.50	8.55	15.85
8	2.60	8.95	16.60
8.5	2.65	9.30	17.40
9	2.70	9.80	18.15
9.5	2.80	10.00	18.95
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D CELLS	QTY. 2	$13.21
9 VOLT	QTY. 1	$13.21

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C CELLS	PKG. 1	$3.78 ea.
D CELLS	PKG. 1	$3.78 ea.
9 VOLT	PKG. 1	$7.57 ea.

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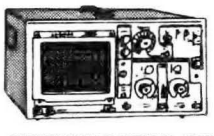

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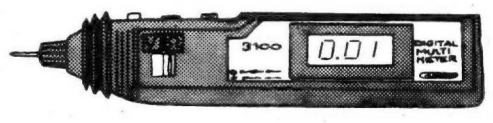

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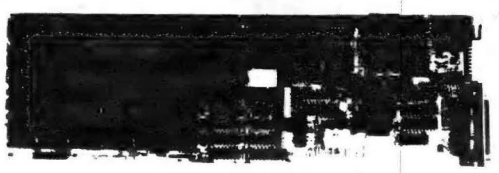

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†second serial port optional

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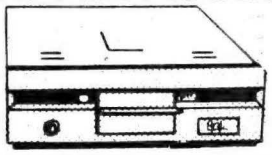
APPLE ACCESSORIES



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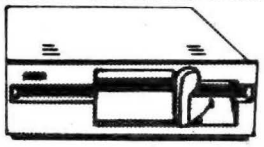

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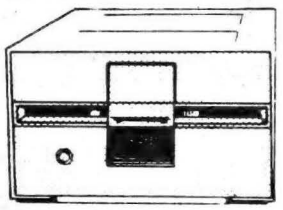

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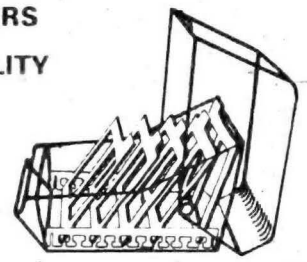

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OK-Writer
Continued from page 106

which OK-WRITER adds that are quite unique and not available on a 92. One is the ability to program most of the available functions directly from the front panel. This is done by using the existing switches in a multifunction mode. The advantage of this is that you can select or change the print mode outside of the application program. Another unique feature is the ability to examine the status of features currently selected, and if you forget how to select a particular function, a Help function is there for reference. Also, if things are still not going well, there is a feature which causes the printer to print the character codes which it is receiving. All these features are very useful and make the printer easier to use. It is obvious that the engineers who developed this upgrade tried very hard to build in useful functions.

I really like this upgrade, but there are some things about it which can be somewhat annoying. For instance, in some of the new modes, the printer has a tendency to screech probably because the indexing motors are being pulsed at a higher rate. Dot matrix printers are notoriously noisy and this additional modulation makes matters a bit worse. A second minor gripe is the lack of super and subscript. This is probably the only feature likely to be missed when comparing the upgrade to the model 92. You can tell by watching the printer go through its paces in a fantastic demo mode that a backward scroll is possible with the carriage. All the capability seems to be there for this feature. I'll bet the code required to include it would have meant another eprom on the upgrade board.

OK-WRITER comes neatly packaged with a 30-page, 5x8 inch, instruction guide. This guide is not a complete programming manual. It is assuming that you understand how to send control codes to the printer. According to the manual, control codes used to achieve the model 92 function emulation are identical. The warranty described in the manual is for 90 days, typical for this type of equipment.

This product is definitely worth serious consideration if you have an 82a and are looking jealously at your friends new 92. The $139 suggested retail price may seem a bit steep but it is easily justified if you are considering the purchase of a new daisy wheel and can settle for a very close approximation of letter quality. Also, if you are thinking about selling or trading in the 82a for a 92, this may be a better alternative. If you are considering the OKIGRAPH board to achieve bit graphics, this may be a better way to go because the bit graphics with OK-WRITER does not disable the serial interface mode as does the OKIGRAPH option board sold by OKIDATA.

Information about this product is available from Rainbow Technologies, Inc., P.O. Box 7200, Costa Mesa, CA 92626. I understand that they also market another product upgrade for the 82a called the PC-WRITER which is IBM PC-oriented. Amongst other things, it has the capability to print the complete PC character set as well as perform many of the described OK-WRITER functions.

I sure hope that my enthusiasm for this product is evident. There must be many, many 82a owners who will appreciate knowing about the availability of this product. ●

Review Of Brother EP-44 Personal Electronic Printer

by Ray Albrektson

I discovered the perfect printing companion for my lap-sized computer—a lap-sized battery-powered printer that prints almost as well as a daisy-wheel printer. The icing on the cake is that the Brother EP-44 Personal Electronic Printer can also double as a memory typewriter, complete with almost 4K of text memory and a 15-character liquid-crystal display.

The EP-44 bears a close resemblance to a number of earlier Brother typewriters. All are low-profile styled portables with a small LCD display centered above the many small square keys. The first Brother portable EP-20 was a tiny typewriter that could not be interfaced to a computer for use as a printer. The Brother EP-22 was introduced shortly afterwards with about 2K of text memory and the ability to edit text before printing it. This made the EP-22 the smallest and cheapest word-processing typewriter on the market.

The problem with both the Brother EP-20 and the Brother EP-22 was the mediocre print quality owing mostly to 5 x 7 thermal dot-matrix print-head. The Brother EP-44, however, has outstanding print quality, plus a host of extra features when used as a memory typewriter.

As A Memory-typewriter. . .

This printer can type a variety of more than 44 characters that are part of different European alphabets by means of a second shift key. If you're writing to correspondents in Germany, France, or Sweden, you can type all those non-English letters just as easily as the usual ABCs.

The keys of the EP-44 feel too spongy and squashy for my taste, but they are not as bad as some other keyboards I have used. The keys have a wide spacing between them which makes it easy to hit the right key. A number of keys have legends in blue which are used with the CODE key (a large blue key to the left of the space bar). These special keys are used with the editing functions of the Brother EP-44 when used in the typewriter mode. Code-D operates the "delete" function, Code-A stands for "append," etc. A number of extra keys are set aside for setting margins, tabs, insertions and deletions. Two keys allow for scrolling either horizontally or vertically through the text in the 4K text buffer. A set of calculator keys operate a four-function calculator which produces results which can be incorporated in the text. Other keys allow for super- and subscripts, and both indexing and reverse indexing.

The editing capabilities of the Brother EP-44 are significant. The "4K" text memory is not the honest 4096 bytes you might expect, but is actually 3726 bytes. This suffices for about three pages of double-spaced text. Sections of text can be cut and pasted to different sections, and words and lines can be deleted or added. Additional functions include word-wrap, automatic centering, and aligning short words or phrases flush with the right margin. As a memory-typewriter, the 15-character LCD window is barely adequate, but I was interested in the Brother EP-44 primarily to use as a computer printer.

Used As A Printer. . .

When used as a printer, few of those slick editing features are available! The Brother EP-44 has a NORMAL/TERMINAL switch. When switched to its terminal mode, the Brother EP-44 serves as a standard TTY-like terminal that can communicate at a variety of baud rates (ranging from 75 to 1200), stop bits, word lengths, and handshaking protocols. It could be used with a modem for transferring text or messages to a time-sharing service, another computer, or even another Brother EP-44! Despite the built in 4K (almost!) of memory for text storage, the buffer available when used as a printer is just 160 bytes.

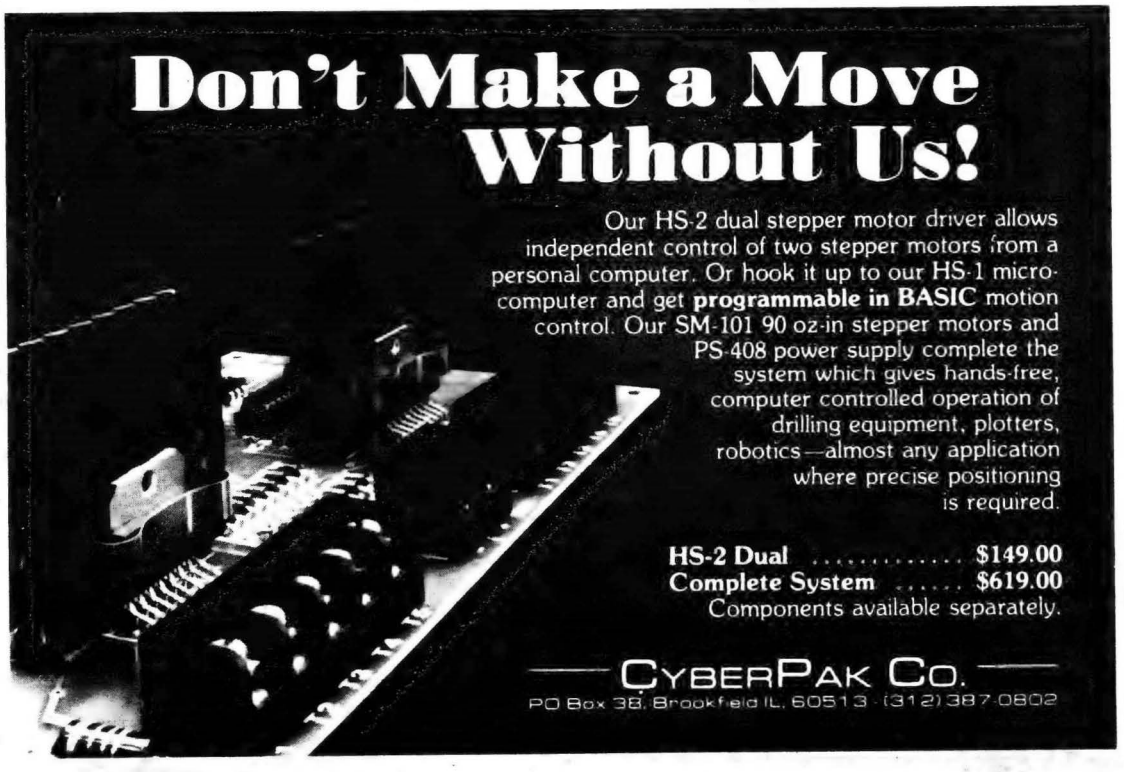
The serial-interface uses a standard 25-pin D-connector (female). I had it interfaced to both a NEC PC-8201A and Radio Shack TRS-100 in minutes. A handy interface guide is included with the printer, and gives clear instructions on how to configure the EP-44 to mesh with the Apple II, Commodore 64, and a variety of Japanese computers. Cable diagrams are included so that the user can either buy a cable or make his own. The manual claims that the Brother EP-44 uses the RS-232C standard, but the signal levels range only from −3 to +3 volts. Some RS-232C serial hardware cannot detect a signal until it is at least +/−5 volts, so check to see if your computer will work with the Brother EP-44 before you buy it!

I set up the Brother EP-44 to operate at 300 baud, 7-bit words, no parity, and an automatic line-feed with carriage return. On the NEC I configured the RS-232 port using the OPEN "COM:3N81XN" command. It worked the first time.

Handshaking Possibilities

Handshaking is always a headache when hooking up an unfamiliar printer. The Brother EP-44 uses two handshaking modes. It uses the XON and XOFF protocols, and the TRS-100 and NEC PC-8201A both respond to that method. If your computer requires hardware handshaking using the CTS or DTR lines, the signal at pin 20 of the EP-44 can be used if you are willing to make a custom cable. That signal is high when the EP-44 can accept data, and

Continued on page 116



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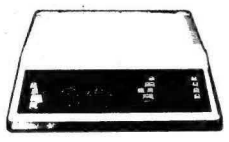

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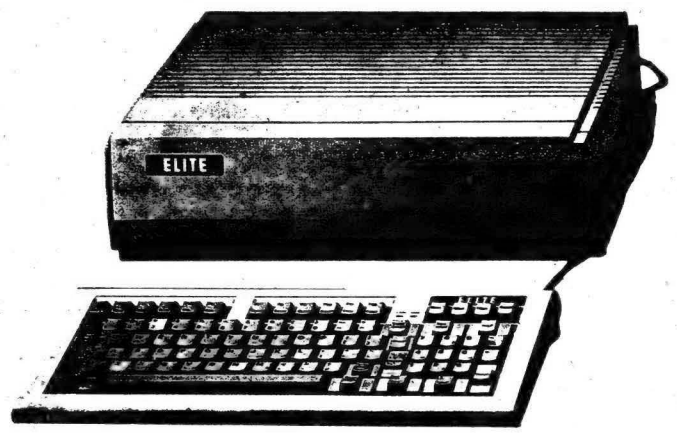

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Albrektson
Continued from page 115

goes low when the EP-44 buffer is full.

Configuring the EP-44 for different baud rates is a breeze. Simply press the "MODE" key, which also doubles as the divide-by key of the calculator. The LCD screen indicates, in sequence, the current baud rate, word length, parity choice, method of handling line-feeds, and handshaking method. Pressing the carriage-return key causes all possible choices to cycle through the LCD window. When the LCD indicates the correct choice, hit the mode key to go on to the next choice. Naturally, the mode settings remain intact unless you remove the batteries.

Excellent Print Quality

The EP-44 prints in almost total silence, making it ideal for use in a shared office, or to take to the library! The printing speed is a nominal 16 cps, which works out to about 10 cps including the time taken for carriage returns. The type is a very elegant sculpted typeface that can barely be distinguished from a daisy-wheel printer using a carbon film ribbon. It is so good that not one of the people to whom I showed a sample recognized it as a form of dot-matrix output. All of my guinea-pigs felt that letters produced on the Brother EP-44 would be more than suitable for the highest-quality business uses.

All this is made possible with a 24 x 18 thermal printhead that prints either on ordinary bond, using a special ribbon, or without the ribbon on thermal paper. Letters are printed at a spacing of 10 characters per inch, and have a razor-edged clarity about them. The letters would look very good with proportional spacing, but that is not possible with the Brother EP-44.

The thermal "ribbon" actually melts a coating of black plastic onto the paper. As a result, the Brother EP-44 works best with very smooth-surfaced papers. Rough papers, such as some fine linen stationery, produce fair-to-poor results. Each ribbon cartridge is claimed to be good for 40,000 characters, or about 25 pages of double-spaced text. The ribbon cartridge used in the Brother EP-44 can print more than twice as many characters than those used in earlier Brother printers, and is not interchangeable with them. Ribbon expenses can work out to almost 10 cents per page, so it may be a good idea to line up a cheap source of thermal paper. This kind of paper is often available in roll form, which can easily be used with the Brother EP-44's optional roll-paper adapter. It even has an out-of-paper alarm, something that my big-buck daisy-wheel printer doesn't have.

The extra characters that can be generated when using the typewriter manually are also available when used as a printer. These characters use code numbers higher than the 128 available for standard ASCII characters, so they can only be used when communicating with 8-bit data. In addition, the host computer word-processing software would probably require extensive patching to make them conveniently available.

Power for this miniature marvel comes from four "D" cells or an optional 6-volt AC adapter. After ten minutes of inactivity, the EP-44 will conserve its batteries by turning off automatically. With batteries, weight is under six pounds and with the half-case that covers the keys, it stands a little less than two inches high. For a portable computer, the Brother EP-44 is tough to beat.

At A Glance Information

Dimensions:
13" x 10.3" x 2.2"
Weight:
5.5 lbs with batteries
Number of keys:
44
Printing speed:
16 cps
Printing pitch:
10 letters per inch (80/line)
Print buffer:
160 characters
Ribbon:
1-time heat transfer ribbon (approx 40,000) characters
Display:
15 digits LCD
2nd shift key:
44 extra international characters
Calculation:
Four-function plus / key
Tabulation:
Available on every column
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1, 1½, 2
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Kodak Subsidiary Introduces Versatile Ink-Jet Printer

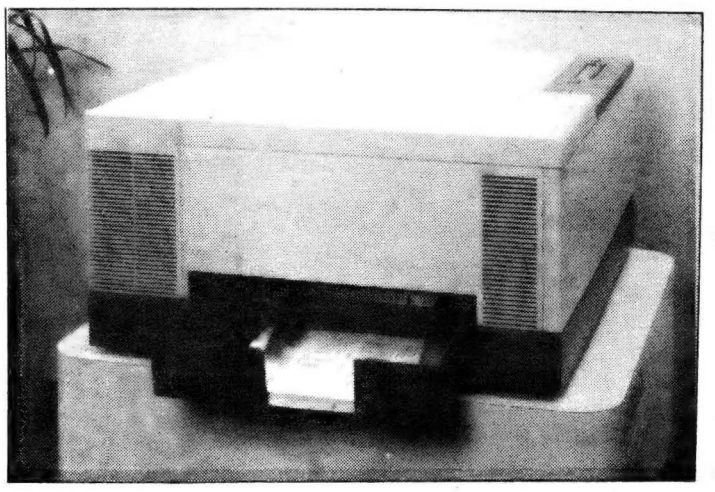
by Linda Thatcher

Diconix, Inc., a subsidiary of Eastman Kodak Company, has introduced the Dijit 1, a multi-function ink-jet office printer offering full-page all-points-addressable printing combining graphics and text.

Dijit 1 has two operating modes: letter-quality, which prints at a resolution of 300 x 300 dots per inch; and draft, designed for higher speeds. The printer provides quiet (less than 55 dba) non-impact operation at print rates of up to 18 pages per minute, or approximately 1,000 pages per hour. Duty cycle is up to 60,000 sheets per month, with an estimated 225,000 sheets between service calls. Operation cost is $0.015 per page.

Standard features include 128K of internal buffered RAM storage; a resident multi-purpose font set; automatic two-sided printing; Centronics, RS-232, and RS-422 interface as well as Xerox 2700 emulation; 500-sheet input/output bin capacity; and self-test/ operator diagnostics. Other interface options, including a video interface, are planned.

Formats are controlled by the host terminal, while super- and subscripting are done automatically. Graphics and text can be combined or overlaid on the same page, i.e., multiple passes over the same page can print a form on the first pass and fill it in on the second. The printer can print in either portrait or landscape modes, or both, in a variety of typefaces that Diconix has licensed from leading typographic design houses. Typefaces are available in roman and italic, medium and bold weights; typewriter fonts are also available. Type sizes, ranging from four to 36 points, can be combined within any document; in addition, logotypes for trademarks or company names can be generated.



Dijit 1, Diconix' new high-speed, multi-function ink-jet printer

A unique design for two-sided printing turns the paper over within a paper path of less than two feet; by comparison, other machines that print on both sides require the paper to travel as many as 12 feet. The Dijit 1 prints on plain bond, cut sheet paper, or transparencies, and will accommodate letter, legal, or A4 (European standard) size stock.

The Dijit 1 employs binary deflection, multiple array ink-jet technology. The term, "multiple array" refers to the printer's use of a specially designed print bar containing an array of microscopic holes that produce millions of ink droplets per second to print sharp, highly legible images and type designs. Diconix' proprietary ink formula is an integral part of the printing system.

Diconix' Dijit 1 will be available for $5,000 to $7,500 in OEM quantities in the first quarter of 1985. ●

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DEC Introduces VAXstation I Workstation System

Digital Equipment Corporation has enhanced its VAX family of computers with the introduction of its VAXstation I, the company's first true 32-bit single user workstation system. The new system, which incorporates the MicroVAX I, provides VAX/VMS resources in a desk unit, including high-resolution graphics and multi-windowing capabilities, to scientists, engineers, and other technical users.

Typical applications include laboratory data analysis, scematics capture, process control, and software development.

Based on VAX computer architecture and the VAX/VMS operating system, VAXstation I is able to run a wide range of currently available "world-class" software, taking advantage of a decade of development languages, productivity tools, information management, networking, and application programs. New window manager and graphics system software have been integrated into the MicroVMS operating system, specifically for the VAXstation I. The new workstation system supports GKS (Graphic Kernel System), the emerging industry standard, as its first graphics application interface language.

The VAXstation I can be connected to DECnet/Ethernet computer networks, enabling users to access resources of larger VAX computers, VAX-clusters, and other VAXstation I workstation systems in the network.

The new system features a monitor with a 60-Hz noninterlaced 19-inch screen display with a resolution of 960 (horizontal) by 864 (vertical) pixels. This display will show full page documents and multiple windows concurrently, including both Digital VT100 and Tekronix 4014 terminal emulation. Windows can be manipulated by using a mouse pointing device and pop-ups menus. Digital's LA50 and LA100 dot-matrix printers can be used as options to produce cost-effective printouts of graphics and text directly from the screen.

The complete VAXstation I hardware and software system is priced from $21,095.

Basic configuration for the VAXstation I packaged system is the processor with 1 Mbyte main memory, 1K by 2K bit-mapped video RAM, RX50 dual 400 Kbyte 5.25-inch diskette drive, RD52 31 Mbtye 5.25-inch Mini-Winchester-technology disk, 19-inch monochrome monitor, and mouse. Licenses for the MicroVMS operating system and workstation software are standard, as is the GKS Level 0b graphics interface. An additional 1 Mbyte of memory, Ethernet interface, dot-matrix impact printers, and additional VAX/VMS software products are available as options.

For more information, contact DEC, Maynard, MA 01754 or your local DEC representative.

Mention that you read it in Computer Shopper. ●

ATARI

Applying The Atari

by Jeff Brenner

Hello 1985! 1984 brought some more rough times to Atari. First there was the realization that profits were gone for good. Then there was Atari's typical management confusion followed by massive layoffs and more layoffs. Later in the year, Jack Tramiel, the former president of Commodore who killed Atari in the first place, bought the company with its multi-million dollar debt from Warner Communications. In his efforts to consolidate Atari, more layoffs were made and Atari divisions around the country were shut down. Even Atari's famed toll-free telephone number was eliminated. Then we witnessed more layoffs and still more layoffs. By the end of the year, I would guess that Atari employed maybe five workers, a telephone operator and 150 lawyers.

Atari has told us that they'll be bringing out new 16-bit and 32-bit machines with incredibly low prices this year. Well, I can't even be 100% certain that Atari will still exist by the time you read this. Let's think positively, though, and hope that Atari will be able to change things around in 1985.

Last month we concluded with Program Perfect, a routine to prevent typing errors in programs entered from this column. This month we'll learn how to use Program Perfect and we'll test it on a program dedicated to the new year. Before we do that, let's take a look at the reader mail and some new books.

Reader Mail

There are two errors in the first ATARI disk directory program (August). First, the line, 6 IF FILE$(5,16) = "FREE" THEN 8, blows up with an ERROR message! It should be IF FILE$(5,8) = "FREE." Second, the DIM FILE$(15) is too short and you lose the size of files in sector count. I would suggest DIM FILE$(99).

Tom Snow
W. Lafayette, Indiana

You're absolutely right, and I apologize for the error. As you suggest, line 6 could be changed to:

```
IF  FILE$(5,8) = "FREE"
    THEN 8
```

However, this will cause the program to stop if it happens to encounter a file name such as "AZFREEZE.BAS." The line should have read:

```
IF  FILE$(5,16) = "FREE
    SECTORS" THEN 8
```

The "SECTORS" was omitted.

You're also correct in stating that FILE$ is not dimensioned at a large enough value. It should have been dimensioned at 17 for proper operation. Any larger value, such as 99, will work as well. Following is the complete corrected routine:

```
1 REM DIRECTORY
PROGRAM
 2 DIM FILE$(17)
 3 OPEN #1,6,0,"D:*.*"
 4 INPUT #1:FILE$
 5 PRINT FILE$
 6 IF FILE$(5,16) = "FREE
SECTORS" THEN 8
 7 GOTO 4
 8 CLOSE #1:END
```

Those of you with DOS III should change line 6 to:

```
6  IF  FILE$(5,15) = "FREE
       BLOCKS" THEN 8
```

since this DOS works with blocks instead of sectors.

I am using the Atari assembler-editor cartridge and want to combine two source files I have created separately. When I use ENTER, it loads in the second file, but erases the first. Any ideas?

A. Robinson
New York, New York

Yes. In BASIC, the ENTER command will merge a program with the program residing in memory. When using the assembler/editor, you must tack on a ",M" for merging files. For example, to merge SOURCE.ASM with a source code already in memory, use:

ENTER #D:SOURCE.ASM,M for disk or ENTER #C:,M for cassette.

Books

I received two books for the Atari from Little, Brown and Company (Boston, MA) which might interest you. The first is *Let's Learn BASIC—a kid's introduction to BASIC programming on ATARI home computers* by Ben Shneiderman (194 pages, softcover, $8.95). Intended for eight through 14 year olds, adults interested in learning BASIC should find it equally helpful. The book discusses the PRINT command, the INPUT command, the FOR-NEXT loop, the IF-THEN statement and other BASIC commands in a relatively straightforward style. The random and integer functions are described, as well as strings and variable arrays. However, the Atari's graphics and sound, which the young appreciate the most, are not covered. Other versions of this book are available for IBM, Commodore 64, and Apple users.

Home Applications and Games for the ATARI Home Computers by Timothy P. Banse (134 pages, softcover, $14.50) contains 31 short BASIC programs such as Checkbook Balancer, Home Inventory Log, Trip Cost Tabulator, and games such as Beowulf versus Grendel, and, of course, Ghost Town Vampire Girls. Some are useful, though others seem to be there to take up space. The book shows how each program works by explaining important lines, and listing the variables used. The author offers a disk of all the programs for $9.95. If you lay out the $14.50 for the book, I'd suggest spending another $9.95 for the disk to save you the time of entering the programs.

Using Program Perfect

Now we'll learn how to use Program Perfect, which was listed here last month. If you're new to Computer Shopper and did not get last month's issue, send me a self addressed stamped envelope for a listing of this program.

If you haven't entered last month's program yet, why not? If you have entered it, check it over a few times and make sure there are no mistakes. A mistake in a program which checks other programs is bad news!

Since last month, I've made a few minor improvements to the program, so change lines 30000, 30070, 30020, 30250 and 30260 to the following:

```
30000 CLR:CLOSE #1:CLOSE
#2:N1 = 1:N2 = N1 + N1:N84 = 84:N85 = N84 + N1:N39
 = 39:N65 = 65

30070 POKE 702,64:POKE694,0:GET #N2,N:IF N = 126
AND I>N1 THEN PRINTCHR$(30);" - ";CHR$(30);:I =
I - N1:GOTO 30070

30220 POSITION N2,10:PRINTCHR$(156):LN$(5,LEN
(LN$)):PRINT :PRINT :PRINT CHR$(157);"CONT"

30250 T = NL:POSITION N2,10:INPUT #N1;LN$:FOR
I = N1 TO LEN(LN$):T = T + ASC (LN$(I,I)) 30260 IF T
650 THEN T = T - 650
```

You must make these changes for the program to be compatible with the codes we'll be entering. Note that in effect, **CLR:CLOSE #1:CLOSE #2** is added to line 30000 while **N676 = 676** is deleted, **POKE 702,64:POKE 694,0:** is added to line 30070, **CHR$(156);** and a **PRINT :** are added to line 30220, **T = NO** is changed to **T = NL** in line 30250, and the two **N676s** in line 30260 are changed to **650s**.

Now Program Perfect should be ready to use, and we'll first test it with a short, four-line program. Before you do anything, though, SAVE it to cassette or diskette. Since Program Perfect erases itself from memory after it helps you enter a program, it is important that you save it **before** you use it.

Following is the program we will enter with Program Perfect:

```
CTJ 10 REM TEST OF PRO-
GRAM PERFECT
LAJ 20 PRINT "THIS IS A
TEST"
WMJ 30 GOTO 20
OJZ 40 END
```

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Brenner
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Note the three letters to the left of each line number. This is the code used by Program Perfect to check the line for errors, and to determine the next line of the program for its automatic line numbering feature.

When you RUN Program Perfect, you are asked to enter the starting line. This is the first line of the program you are entering. Since the first line of our demonstration program is ten, enter 10 for this prompt. The line below will now show the following:

■ - - 10

The three hyphens preceeding the 10 are for the three-letter code. Type the code for line 10, CTJ. The display will now show:

CTJ 10 ■

The cursor will have moved past the line number to allow you to enter the line. Type in the remainder of line ten. The display should show:

CTJ 10 REM TEST OF PROGRAM PERFECT■

Press RETURN. Program Perfect will perform a few screen manipulations below the line you have entered as it checks the line for errors and places it in the computer's memory as a real program line. You'll get a buzz with an "ERROR - TRY AGAIN" message if you've made a syntax error, or if the line does not check against the code. The line doesn't necessarily have to be in error; a mistake in the three-letter code will also trigger the error message. You'll have to re-enter the three-letter code, but the rest of the line will remain intact so you may correct it using the cursor control keys. To erase the entire line and the code, press SHIFT-CLEAR. Program Perfect will not allow you to move the cursor out of its three-line entry area.

If the line is entered correctly, the program will automatically display the next line number of the program. Enter the codes and program lines for each line number that appears until the entire program is entered.

Program Perfect allows you to use all abbreviations, such as GR. for GRAPHICS and G. for GOTO. However, do not use ? for PRINT or vice versa as the computer treats these as two different commands. The same goes for GOTO and GO TO. Use PR. as an abbreviation for PRINT, and stick to the one-word GOTO, as this is the only form that will appear in the programs in this column.

You do not have to follow the exact spacing of the program line unless the spacing is within quotes. For example:

10 PRINT "HELLO":GOTO 10

can be entered as:

10 PRINT "HELLO" : GOTO 10

and you won't get an error. But if you try to enter the following:

10 PRINT " HELLO ": GOTO 10

you'll get an error message.

If you like to leave out all spaces (which, incidentally, does not save you any memory on the Atari) you could enter:

10PRINT"HELLO":GOTO10

and it will be accepted. But be careful of lines such as:

10IFA = BTHENGOTO10

as the computer will interpret BTHENGOTO10 as a single variable and will give you an error. In this case, you must put a space after the variable:

10IFA = B THENGOTO10

This does not only apply when you are using Program Perfect, but whenever you are using Atari BASIC.

After you enter the last line of the program (which has a three-letter code ending with a "Z"), Program Perfect will print "END OF PROGRAM - STAND BY." It will then take about five seconds while it erases itself from memory and leaves you only with the lines you have entered. You can then list, save or run your program.

What if you don't enter the whole program in one sitting? You can press BREAK and SAVE what you've already typed. Since Program Perfect is in memory, you will be saving it as well as the lines of the program you have entered. When you are ready to enter more of the program, simply LOAD it back in and type GOTO 30000 (the beginning line of Program Perfect). Then enter the line number at which you left off for the "Starting number:" prompt and enter the rest of the program.

If you tried to enter the four-line sample program but couldn't, you've probably

Continued on page 126

Seduction. . .

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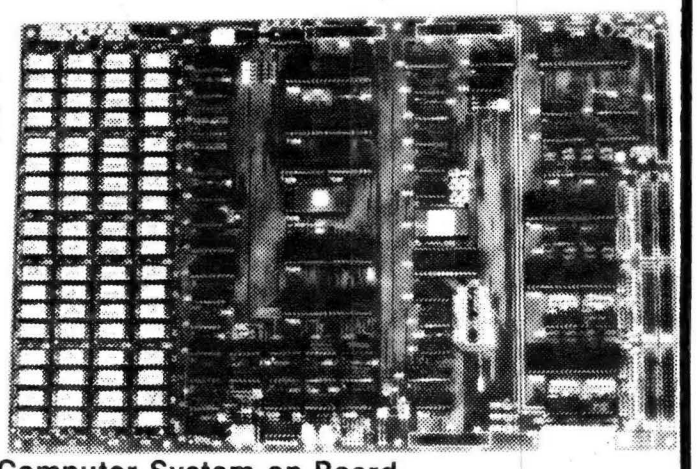

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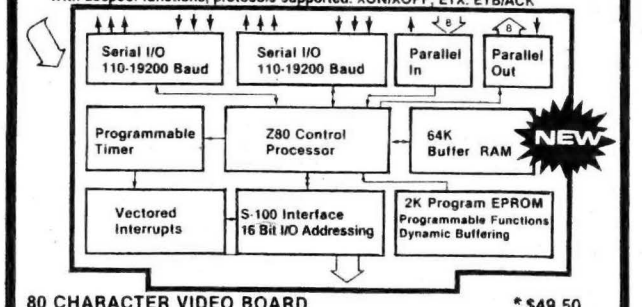

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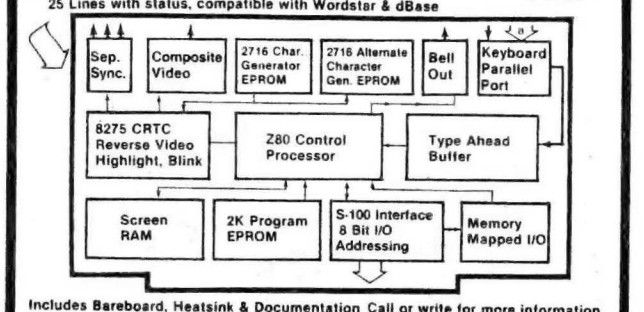

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PROCOMP, 844 VERNON ST.. MANCHESTER. CT 06090
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THE UCONN PC CLUB, PO BOX 542. STORRS. CT 06268

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APPLE JAX USERS GROUP, 7670 KNOLL DR. NORTH. JACKSONVILLE. FL 32221
APPLE METROPOLIS, 7220 SW 131 Ave.. Suite #133. Miami. FL 33183
ATARI COMPUTER CLUB OF SOUTH BREVARD, (AN INDEPENDENT USERS GROUP). C/O LOREN FULLER. 530 SYLVIA RD.. W. MELBOURNE. FL 32901
ATARI COMPUTER CLUB OF THE PALM BEACHES, C/O JIM WOODWARD. 15993 S.W. 8TH AVE.. B-101. DELRAY BEACH. FL 33444
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SPACE COAST NEC USERS GROUP, C/O FRANK SCHNEIDER. 70 CEDAR AVE..UNIT #1. COCOA BCH. FL 32931
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TAMPA BAY COMMODORE CLUB, PO BOX 23952. TAMPA. FL 33623
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TAMPA BAY TRS-80 USERS GROUP, PO BOX 76001. ST PETERSBURG. FL 33734
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THE SOUTH FLORIDA ZX USERS GROUP, PO BOX 057381. WEST PALM BEACH. FL 33405
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THE 99'ER TI USERS GROUP, PO BOX 1381. MAITLAND. FL 32751
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ATLANTA C-64 USERS GROUP, 1767 BIG VALLEY LANE. STONE MOUNTAIN. GA 30083
ATLANTA COMPUTER SOCIETY, PO BOX 888771. ATLANTA. GA 30356
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SIVIC-9000, 362 PEACHTREE AVENUE. ATLANTA. GA 30305
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TRS-80 USER'S GROUP OF ATLANTA, 1637 COLUMBIA DR.. DECATUR. GA 30034

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IOWA

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IOWA CITY TRS-80 USERS GROUP, C/O JOHN GREEN. P.O. BOX 1494. IOWA CITY. IA 52244
IOIWA, 7 TIMBERLANE DR.. CLEAR LAKE. IA 50428
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BAYOU 99 USERS GROUP. PO BOX 921. LAKE CHARLES. LA 70602
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TRANET, PO BOX 567. RANGELEY. ME 04970

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PIEDMONT TRIAD ATARI USERS GROUP, 6104 KNIGHT ROAD. GREENSBORO, NC 27410
RALEIGH COLOR COMPUTER CLUB, PO BOX 681. GARNER, NX 27259 C/O DAVID ROPER
RALEIGH OSBORNE COMPUTER CLUB, PO BOX 53754. FAYETTEVILLE, NC 28305
TACC, POB 17523. RALEIGH, NC 27619
TACS, PO BOX 7073. GREENSBORO, NC 27417-0073
TIMEX USERS GROUP, RT. 3 BOX 64E. ROBINSVILLE, NC 28771
TRIAD AMATEUR COMPUTER SOCIETY, PO BOX 7073. GREENSBORO, NC 27417
WILMINGTON TRS-80 USERS GROUP, 1605 PRINCESS ST., WILMINGTON, NC 28401
WILSON TRS-80 USERS' GROUP, PO BOX 336. LUCAMA, NC 27851

NORTH DAKOTA

BASE COMPUTER HOBBYISTS GROUP, C/O 101-1 AVION WAY. MINOT AFB, ND 58704
GRAND FORKS IBM PC U.G., 717 IVES STREET. BUXTON, ND 58218
M.A.D. H.U.G. 99/4A, DENNIS SCHJELDAHL. 509 REEVES DRIVE. GRAND FORKS, ND 58201
TRS-80 COLOR COMPUTER CLUB, PO BOX 218. MINOT, ND 58701

OHIO

ACE (ATARI UG OF COL.), 6632 LISAMARIE RD., COLUMBUS, OH 43229. C/O ED BILL ECKERT
AD A STAR (ATARI MICROCPU NET), C/O JACK McKIRGAN 2 WD8BNG. 4749 SR 207 NE WASHINGTON C.H., OH 43160
AIM-65 USER'S GROUP, C/O DONALD CLEM. RR #2. SPENCERVILLE, OH 45887
AKRON IBM PC CLUB, BOX 1205. AKRON, OH 44309
AMATEUR COMPUTER SOCIETY OF CENTRAL OHIO (ACSCO), PO BOX 28355. COLUMBUS, OH 43228-0355
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APPLE-DAYTON USERS GROUP, POB 1666. FAIRBORN, OH 45324
ATARI USERS GROUP, 6895 N. HIGH ST., WORTHINGTON, OH
BUCKEYE 99ers, 2424 MANSFIELD-LUCAS RD., MANSFIELD, OH 44903
CCC (RS COLOR CPU), PO BOX 478. CANFIELD, OH 44406-0478. C/O ED GINNY KOMARA
CENTRAL OHIO ADAM USERS GROUP, 730 THURBER DR. APT. N. COLUMBUS, OH 43215
CENTRAL OHIO COMMODORE USERS GROUP, 107 S. WESTMOOR AVE., COLUMBUS, OH 43204
CENTRAL OHIO 99ers, 1456 GRANDVIEW AVE., COLUMBUS, OH 43212
CIN-DAY TI USER GROUP, PO BOX 519. WESTCHESTER, OH 45069-0519
CINCINNATI COMP CLUB, 6515 KENVIEW DR., CINCINNATI, OH 45243
CINCINNATI COMPUTER CLUB, 1@@ CONVERSE DRIVE. CINCINNATI, OH 45240
CINCINNATI TRS-80 USERS GROUP, 5380 BAHAMA TERRACE. APT. 8. CINCINNATI, OH 45233
CINCINNATI TRS-80 USERS GROUP, 3211 MARYLAND AVE. CINCINNATI, OH 45204
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CINTUG (CINcinnati TRS Users Group), C/O LEE PENN. 6798 WEATHERIDGE DR. CINCINNATI, OH 45230
CLEVELAND DIGITAL GRP, PO BOX 17440. CLEVELAND, OH 44117
COACH (APPLE UG) OF COLUMBUS, C/O JAY WRIGHT. 1887 WILLOWAY CIRCLE N., COLUMBUS, OH 43220
COGWHEELS CINCINNATI OSBORNE GROUP, 6404 COFFEY ST., CINCINNATI, OH 45230
COKUG, CENTRAL OHIO KAYPRO USERS GROUP, 385 WEST MAINS TREET. WESTERVILLE, OH 43081. C/O JOE BAXTER OR JIM DAVIS
COLOR COMPUTER CLUB, PO BOX 478. CANFIELD, OH 44406
COLUMBUS CP/M-ACSCO USERS, BOX 28355. COLUMBUS, OH 43228-0355
COLUMBUS MAX80 USERS, (M.A.X.U.G.). BOX 28355. COLUMBUS, OH 43228-0355
COLUMBUS TRS-80 COLOR COMPUTER USERS, C/O GARY DAVIS. 2153 LEAH LN., REYNOLDSBURG, OH 43068
COLUMBUS VIC-20 USERS GROUP, 169 N. VINE. WESTERVILLE, OH 43081. C/O LEN HOLLAND
COOUG, CENTRAL OHIO OSBORNE USERS GROUP, DEVRY INST., 1350 ALUM CREEK DRIVE. COLUMBUS, OH 43209 C/O DALE BROWN
CUYAHOGA VALLEY COMPUTER CLUB, C/O BRIAN HEIN. 3053 ROHRER RD., WADSWORTH, OH 44281
DATUG, C/O THOMAS H. MAGEE. 3360 Fair Oaks Dr. Xenia, OH 45385
DAY-ATARI, 1461 HUFFMAN AVE., DAYTON, OH 45403
DAYTON MICROCOMPUTER, 2629 RIDGE AVE., DAYTON, OH 45414
DAYTONIAN COMMODORE TELE-COMPUTE USERS GROUP, PO BOX 24443. DAYTON, OH 45424
DELAWARE OHIO VIC-20 USERS GROUP, PO BOX 216. NEW ALBANY, OH 43054. C/O TOM MARTIN 855-2404
ENGLEWOOD COMPUTER USERS GROUP, 313 CANDY LANE. UNION, OH 45322 (513) 836-3273
GOODYEAR COMPUTER CLUB, GOODYEAR TIRE CO., AKRON, OH 43316
NEO APPLE CORP., BOB CALDWELL. 10112 RIDGEWOD DR., TWINSBURG, OH 44087
LAKE ASHTABULA IBM PC UG, POB 175. MADISON, OH 44057
LIMA AREA TI 99/4A USERS GROUP, 1513 WEST WAYNE STREET. LIMA, OHIO 45805
NEO APPLE CORPS, C/O NORM HENKE. 21750 MILLER AVE., EUCLID, OH 44119
NEW HORIZONS, WILLIAM SAGER. 612 MEADOW SPRING. MAUMEE, OH 43537
NORTHEAST OHIO COMMODORE USERS GROUP, 5104 MAYFIELD DR., LYNDHURST, OH 44124
OH-MI-TI, DON WOLLENBECKER. 1522 RESWICK, OREGON, OH 43616
OSBORNE USERS OF COL., OHIO INST. OF TECH. 1350 ALUM CREEK DR., COLUMBUS, OH 43209. C/O BILL HOOKER/ DALE BROWN
OSI, NORTH COAST USER'S GROUP, 30600 NAMHAHASSET RD., BAY VILLAGE, OH 44140
ROBOTICS USERS GROUP, APRIL LANE, COL., OH
RUBBER APPLE USERS GROUP, ROBERT M. NEBIKER. 1870 BROOKFIELD DRIVE. AKRON, OH 44313
SAUCE, STARK APPLE USERS COOPERATIVE EXCHANGE, PO BOX 35091. CANTON, OH 44735
SANYO USERS OF CENTRAL OH, C/O ARNIE SKUROW. 5760 CRAWFORD DR., COLUMBUS, OH 43229
SCREAMING EAGLES, C/O DAVID YAROS. 1006 2ND NAT'L BLDG., CINCINNATI, OH 45202
SOUTHEASTERN OHIO COMPUTER SOCIETY, c/o DON SARGENT. PO BOX 1215. CAMBRIDGE, OH 43725
THE LAKE ASHTABULA IBM PC USERS GROUP, PO BOX 175. MADISON, OH 44057
THE PSYCHOLOGICAL – COMPUTER – CLUB, 2118 FOREST LAKE DRIVE. CINCINNATI, OH 45244
TIMEX-P.O.R.T.S. PORTSMOUTH, OHIO REGION TIMEX AND SINCLAIR USER GROUP, 2002 SUMMIT ST., PORTSMOUTH, OH 45662
TIMEX/SINCLAIR USERS GROUP, 4255 S. HAMILTON, COL., OH
TRI-STATE OSI USERS, C/O TED MORRIS. 6306 KINCAID RD., CINCINNATI, OH 45213
TRS-80 – ACSCO, BOX 28355. COLUMBUS, OH 43228
TRS-80 COLOR COMPUTER USERS GROUP, 527 MALVERN DRIVE. PAINESVILLE, OH 44077. C/O ANTHONY RUQUE
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Z80 NEVADA COBOL USER'S (NUG), BOX 28355. COLUMBUS, OH 43228
ZORBA EQUIPMENT USERS GROUP (ZEUS), BOX 1112. ATHENS, OH 45701

OKLAHOMA

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BIG RED APPLE GROUP, 2301 W. MAIN ST., NORMAN, OK 73069
OKLAHOMA LOCAL OSBORNE GROUP, PO BOX 1851. BETHANY, OK 73008
TIMEX SINCLAIR USERS GROUP, C/O BILL CASEBEER. PO BOX 372. OOLOGAH, OK 74053
TULSA AREA COMMODORE USERS GROUP, C/O CRAIG BOWMAN. 7804 N. 117TH E. AVE., OWASSO, OK 74055 (918)272-9755
TULSA COMPUTER SOCIETY, PO BOX 1133. C/O SI HAWK. TULSA, OK 74105. 918-446-5219

OREGON

APPLE BLOSSOM, PO BOX 266. DILLIARD, OR 97432
APPLEUGENE, PO BOX 3267 EUGENE, OR 97403
ATARI COMPUTER ENTHUSIASTS, 3663 VINE MAPLE ST., EUGENE, OR 97405. C/OMICHAEL DUNN
CP/M USER'S GROUP NORTHWEST, 1346 N.E. 28TH. PORTLAND, OR 97232
DOCTOR'S COMPUTER COMMITTEE, 2188 SW PARK PLACE. PORTLAND, OR 97205
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MICRO-CALC BUSINESS USERS GROUP, PO BOX 12039. SALEM, OR 97309
NORTHWEST SANYO ENTHUSIASTS, 5687-H SE INTERNATIONAL WAY. MILWAUKEE, OR 97222
PACIFIC NORTHWEST COMMODORE USERS GROUP, PO BOX 2310. ROSEBURG, OR 97470
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PORTLAND COMPUTER SOCIETY, PO BOX 5494. PORTLAND, OR 97208
PORTLAND IBM PERSONAL COMPUTER CLUB, 12260 SW 124TH AVE., TIGARD, OR 97223
PORTLAND IBM PERSONAL COMPUTER CLUB, PO BOX 2068. BEAVERTON, OR 97075
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WILLAMETTE VALLEY COLOR COMPUTER USERS, C/O BRIAN JAMES. 1850 BAILEY HILL RD., EUGENE, OR 97405

PENNSYLVANIA

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AIRPORT AREA COMPUTER CLUB, PO BOX 710. CORAPOLIS, PA 15108
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ATARI COMPUTER USERS OF TEMPLE UNIV., C/O GLENN SNELBECKER. 8905 PATTON RD., WYNDMOOR, PA 19118
CAPATUG, CAPITOL AREA TRS-80 USERS GROUP. 340 LEWISBERRY RD., NEW CUMBERLAND, PA 17070. MAX WORTHINGTON
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CENTRAL PA. 99/4A USERS GROUP, THE POINT, I-83 AND UNION STREET DEPOSIT, HARRISBURG, PA 17111
CENTRE CO COMPUTER CLUB, WILLARD BLDG. UNIV PK, PA 16802
DELAWARE VALLEY COMPUTER SOCIETY, PO BOX 651. LEVITTOWN, PA 19058
ERIE APPLE CRUNCHERS, PO BOX 1575. ERIE, PA 16507
HARRISBURG PC USERS GROUP, 1195 FAIRMONT DR., HARRISBURG, PA 17112. 717-652-9097
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LEHIGH VALLEY HEATH USERS GROUP, 1425 N. BROAD ST., ALLENTOWN, PA 18104
LEHIGH 99 COMPUTER GROUP, PO BOX 4837. 1501 LEHIGH ST., ALLENTOWN, PA 18103
LVCC, PO BOX 2952. LEHIGH VALLEY, PA 18001-2952
MONROEVILLE APPLE USER GROUP. 579 CARNIVAL DR., PITTSBURGH, PA 15239
NACUG, c/o MARK KRAUSE. BOX 665. SPRING HOUSE, PA 19446
THE NATIONAL EPSON QX-10 USERS GROUP, C/O RICHARD SHOEMAKER. BOX 1076. Lemont, PA 16851
NITTANY USERS OF TEXAS INSTRUMENTS, 625 BERKSHIRE DRIVE. STATE COLLEGE, PA 16803
NORTH AMERICAN COMPUTER SOCIETY APPLE USERS GROUP, PO BOX 2129. WILKES-BARRE, PA 18700. C/O FRANCIS GEORGE
NORTH AMERICAN COMPUTER SOCIETY, ATARI USERS GROUP, PO BOX 2129. WILKES-BARRE, PA 18700. C/O FRANCIS GEORGE
PACS, 1613 LINCLON AVE., PROSPECT PARK, PA 19076. (215)583-0612
PENN-JERSEY COLOR COMPUTER CLUB, PO BOX 2742. LEHIGH VALLEY, PA 18001
PHILADELPHIA AREA COMPUTER SOCIETY, LASALLE COLLEGE. BOX 312. PHILA., PA 19141
PHILADELPHIA REGIONAL OSBORNE GROUP, PHROG, BOX 340. LAMPLIGHTER PLAZA. KULPSVILLE, PA 19443. C/O JOE GERVASE
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PITTSBURGH ATARI COMPUTER ENTHUSIASTS, 111 MONAHAM STREET. ALIQUIPPA, PA 10551
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S.P.A.C.E., ATARI USER GROUP, RD 3 WHITE DOGWOOD DR., GITTERS, PA 17319
SPACE. C/O DENSLOW. 14 PHEASENT CT. MECH. PA 17055
T.I. 99/4A, PITTSBURGH USER'S GROUP. BOX 18124. PITTSBURGH, PA 15236
SUSQUEHANNA VALLEY USERS GROUP, ATARI, COMMODORE, & TI 99/4A. C/O RAY KROHN, PRESIDENT. P.O. 5 BOX 145. DANVILLE, PA 17821
TI 99/4A USERS PHILADELPHIA CLUB, 8540 TOLBUT ST., PHILADELPHIA, PA 19152
TI-99/4A PITTSBURGH USERS GROUP, BOX 18124. PITTSBURGH, PA 15236
TRS-80 USERS GROUP OF DELAWARE, 1109 MADISON AVE., PROSPECT PART, PA 19075
TUG-DC, C/O GARY DITLLIO. 1109 MADISON AVE., PROSPECT PARK, PA 19076
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VALLEY FORGE TRS-80 USERS GROUP, 1000 VALLEY FORGE CIRCLE. KING OF PRUSSIA, PA 19406
WYOMING VALLEY COMPUTER CLUB, 302 WYOMING AVE., KINGSTON, PA 18704

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RHODE ISLAND COMPUTER HOBBYISTS, PO BOX 599. BRISTOL, RI 02809
TRI STATE USERS GROUP, PO BOX 457. LINCOLN, RI 02864

SOUTH CAROLINA

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COMMODORE UPSTATE USERS, P.O. BOX 785. EASLEY, SC 29641 (803) 859-5435
COMMODORE USERS SOCIETY OF GREENVILLE, C/O HORIZON RECORDS-HOME COMPUTERS. 347 S. PLEASOUTBURG DR., GRENVILLE, SC 29607
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LORDS OF BASIC USERS GROUP, C/O ROB WHISONANT. PO BOX 459. LANDSON, SC 29456
MIDLANDS 80 COMPUTER CLUB, PO BOX 7594, COLUMBIA, SC 29202
NONAME APPLE CLUB, C/O JAMES SUMNER. 80 DUNNEMANN AVE., CHARLESTON, SC 29403
PIEDMONT 99'ers USERS GROUP, PO BOX 5921. GREENVILLE, S.C. 29606
THE COMPUTERNIKS, C/O USC CC BOOK STORE. PO BOX 1954. CONWAY, SC 29526

SOUTH DAKOTA

SIOUX FALLS AREA HUG, C/O LORIN DOBSON. 2001 S. SPRING AVE., SIOUX FALLS, SD 57105
SIOUXLAND 99ERS UG, 2310 S. COVELL. SIOUX FALLS, SD 57105

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ATHENS 99/4A COMPUTER USERS GROUP, PO BOX 309. ATHENS, TN 37303
CHATTANOOGA USERS GROUP (CHUG), PO BOX 136. HIXSON, N 37343. C/O EARL CONWAY
EAST TENNESSEE CENTRAL HEATH USERS GROUP, 7608 LUSCOMBE. KNOXVILLE, TN 37919. c/o WALTER SCOTT. 615-690-3864
ET 64 USERS GROUP, PO BOX 495. KNOXVILLE, TN 37901
HOLSTON VALLEY USERS GROUP, 310 WILLOW ST., MT. CARMEL, TN 37642
K-TOWN 99/4A USERS GROUP, 3506 GARDEN DRIVE. KNOXVILLE, TN 37918. (615)687-8869
MEMPHIS AREA IBM-PC USERS GROUP, PO BOX 241756. MEMPHIS, TN 38124. C/O PETER VERMILYE
MEMPHIS COMMODORE USERS CLUB, P.O. BOX 38095. BARTLETT, TN 38134-0095
MUSIC CITY 99'ER USERS GROUP, PO BOX 4072. MADISON, TN 37116
NASHVILLE COMMODORE USERS GROUP, PO BOX 121282. NASHVILLE, TN 37212. C/O DAVE RUSHING OR DALLAS DENNY
TUG (TIMEX USERS GROUP), 1501 - B COMPTON AVE., NASHVILLE, TN 37212

Brenner
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made some mistakes in entering Program Perfect. Re-check it carefully—make sure you've made all the changes that were mentioned previously. Remember to save any corrections you make to Program Perfect before you run it.

New Year's Program

Now, how would you like a longer program with which to test Program Perfect? Our program for the new year is one which prints banners. You can use it to make giant "HAPPY NEW YEAR" signs if you want. It requires a printer and fan-fold paper.

Enter the banner program with Program Perfect. If you are not using Program Perfect, ignore the three letters preceding each line number when you type the program. When you RUN the program, you are asked for the height. This is the height of each letter of the banner. Since the banner's letters are printed sideways, an 80-column printer can produce letters which are 80 characters in height, so enter 80. If you have a 40-column printer, or if you want smaller sized letters, enter a smaller number.

Next, you are asked for the length. This is the number of lines of characters which form the length of each letter. 24 is a typical value. Enter a greater or lesser number for wider or thinner letters.

Now the program asks for a character. This is the character the printer will use to form the letters of the banner. An asterisk or the letter X are good choices.

When the "ENTER MESSAGE" prompt appears, enter what you want to be printed on the banner, such as HAPPY NEW YEAR. Your banner will be printed.

Next time, we'll learn where the banner program gets its characters from, we'll enter a test/study program for teachers and students, and more.

Readers' questions, comments and contributions are welcome. Address all correspondence to:

Jeff Brenner's
"Applying the Atari"
c/o Computer Shopper
P.O. Box F
Titusville, FL 32781 ●

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BANNER PROGRAM

EN  10 REM BANNER PROGRAM
SW  20 OPEN #1,4,0,"P:":DIM A$(100),S$(20),Z$(20),C$(20),B(7),S(7),H(7)
VU  30 CS=PEEK(756)#256:FOR I=0 TO 7:B(I)=INT(2^I+0.5):S(I)=0:NEXT I
IF  40 PRINT "HEIGHT (80)";:INPUT H:PRINT "LENGTH (24)";:INPUT L:H=H/8:L=L/8
WW  50 PRINT "CHARACTER (*)";:INPUT S$:S$(20)=S$:S$(2)=S$
MD  60 Z$(1)=CHR$(32):Z$(20)=CHR$(32):Z$(2)=Z$
BD  70 Z$=Z$(1,H):S$=S$(1,H):PRINT "ENTER MESSAGE";:INPUT A$:FOR I=1 TO LEN(A$)
GJ  80 D=ASC(A$(I,I)):INV=0:IF D>128 THEN D=D-128:INV=1
TU  90 IF D<32 THEN D=D+96:GOTO 110
AJ 100 IF D>96 THEN D=D+32
MU 110 A=(D-32)*8:FOR C=0 TO 7:S(C)=0:NEXT C:FOR B=7 TO 0 STEP -1
LJ 120 FOR T=7 TO 0 STEP -1:PK=ABS(255*INV-PEEK(T+CS+A))
FA 130 IF PK-B(B)-S(T)>=0 THEN S(T)=S(T)+B(B):H(T)=1:GOTO 150
UQ 140 H(T)=0
SU 150 NEXT T:FOR D=1 TO L:FOR J=7 TO 0 STEP -1:IF H(J)=1 THEN PRINT #1;S$;
UU 160 IF H(J)=0 THEN PRINT #1;Z$;
MZ 170 NEXT J:PRINT #1:NEXT D:NEXT B:NEXT I:RUN
```

Users Groups

TEXAS

AACE ATR-8000 SPECIAL INTEREST GROUP, 9401 MOUNTAIN QUAIL ROAD. AUSTIN. TX 78758
ABILENE TIMEX SINCLAIR UG C/O CHRIS NYSTROM. 609 EN 18th. ABILENE. TX 79601
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ALAMO PC ORGANIZATION, PO BOX 16433. SAN ANTONIO. TX 78216
AMATEUR RADIO CLUB, PO BOX 4391. WICHITA FALLS. TX 76308
APPLE PI, C/O CALY FRANCELL. 2105 ANDREWS HWY.. ODESSA. TX 79761
ATARI COMPUTER ENTHUSIASTS, 2211 S. LIPSCOMB. AMARILLO. TX 79109
ATARI COMPUTER USER GROUP OF DALLAS, PO BOX 1118. ADDISON. TX 75001
AUSTIN ATARI COMPUTER ENTHUSIASTS, 8207 BRIARWOOD LANE. AUSTIN. TX 78758
AUSTIN TRS-80 USERS GROUP, PO BOX 43422. AUSTIN TX 78745
BASIC SOCIETY—IBM USERS GROUP, BOX 815099. DALLAS. TX 75281
BIG COUNTRY HOME COMPUTER USER GROUP, PO BOX 2114. ABILENE. TEXAS 79604
CENTRAL TX COMPUTER, 14 LAVACA. AUSTIN. TX 78701
CENTRAL TEXAS COMPUTER ASSOCIATION, PO BOX 4391. WICHITA FALLS. TX 76308
CENTRAL TEXAS 99/4A USERS GROUP, PO BOX 3026. AUSTIN. TX 78764
CLEARWATER OSBORNE GROUP, C/O MAYNARD HUNTLEY. PO BOX 57613. WEBSTER. TX 77598
CLUB 1802, PO BOX 985. DICKINSON. TX 77539
COMMODORE (HOUSTON) USERS GROUP, C/O JOHN WALKER. EDITOR OF NEWSLETTER. 8738 WILDFOREST. HOUSTON. TX 77088
COMP HOBBYIST GROUP, UTA. ARLINGTON. TX 76109
COMPUGUILD TRS-80 GROUP, 2211 S. LIPSCOMB. AMARILLO. TX 79109
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CORPUS CHRISTI TRS-80 USERS GROUP, 6214 HIDDEN COVE. CIRPUS CHRISTI. TX 78412
D/FW IBM USERS, 1913 DALWORTH ST.. GRAND PRAIRIE. TX 75050
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DALLAS COUNTY COMMODORE CLUB, 1913 DALWORTH STREET. GRAND PRAIRIE. TX 75050
DALTRUG, TRS-80 USERS GROUP, INC., PO BOX 400472. DALLAS. TX 75240
DYNASTY SMART-ALEC USER'S GROUP, (S.M.U.G.). C/O RICHARD ZERWICK. 15033 KIMBERLY LANE. HOUSTON. TX 77079. SOURCE ID #TCW003
EAST TEXAS EAGLE USERS, 1809 BELL. LONGVIEW. TX 75602
EL PASO COMP GRP, ELECTRONICS BLDG. EL PASO. TX 79901
FORT WORTH APPLE USERS GROUP, BOX 13903. ARLINGTON. TX 76013 C/O GARTH CLOSE
GROUP BUY USERS, PO BOX 830119. RICHARDSON. TX 75083
GROUP 80, DAVIS HALL. ARLINGTON. TX 76109
HOT APPLE PIE, PO BOX 517. HEITT. TX 76643
HUGTIBBS TI99/4A 2401 CLEAREMONT. ST. JOHN'S SCHOOL. HOUSTON. TX
INTERNATIONAL COLOR COMPUTER CLUB, 2101EAST MAIN STREET. HENDERSON. TX 75652
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LUBBOCK IBM PC SIG, PO BOX 98117. LUBBOCK. TX 79499
MCTRUG, C/O ROBBIE G. YODER. 5413 Rita Kay Lane. Ft. Worth. TX 76119
MIDLAND MICROCOMPUTER USERS, PO BOX 50246. MIDLAND. TX 79710. C/O LONNIE YEE
METROPPLEX CP/M INTEREST GROUP, C/O PO BOX 863909. PLANO. TX 75086
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RIVER CITY APPLE CORPS., PO BOX 13449. AUSTIN. TX 78711
SAN ANGELO APPLE USERS GROUP S.A.A.G., 1322 GREGORY DR.. SAN ANGELO. TX 76905
SUN CITY 99/4A COMPUTER CLUB, PO BOX 6966. EL PASO. TX 79906
SUN METRO ATARI USERS GROUP (SMAUG), #516. 9455 VISCOUNT BLVD.. EL PASO. TX 79925
TAMU UC CLUB, POB M 9. AGGIELAND. STATION. TX 77664
TEXAS SANYO USERS GROUP, C/O 21ST CENTURY CONCEPTS. P.O. BOX 741576. HOUSTON. TX 77274-1576
THE NATIONAL ASSOCIATION OF TRS II USERS, PO BOX 14091. AUSTIN. TX 78761
THE TRIANGLE 99'ERS, 5435 FANNET ROAD #15. BEAUMONT. TX 77705. C/O RAY DAUPHINIAS
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The Dallas Quest

by Richard E. DeVore

Product:
The Dallas Quest
Producer:
DataSoft, Inc.
9421 Winnetka Ave.
Chatworth, CA 91311
Computer:
Performed on Atari
Price:
$39.95

For all of us who have watched the prime time show, Dallas, there is now a way to take part. No, not on television, but on your computer. DataSoft has released a graphics adventure that pits the player as a detective against good old J.R. As the player, I am trying to locate a map which shows the location of a South American oil field that is worth millions of dollars. The opening scene is the living room of the ranch at Southfork. Sue Ellen has hired me to travel to South America and find a map of an oil field that was discovered by Jock Ewing just before he died. I have to go to nine different locations on Southfork in order to obtain various clues and objects that will be needed as the story unfolds. Some will help me leave the ranch without being done in by J.R. or a giant rat. While doing this, I meet Lucy, but cannot ride off with her. Shucks! However, I do learn the location of the airfield.

Continued on page 127

DeVore
Continued from page 126

The most difficult problem that occurs while at the ranch is killing an enormous rat that thinks I would be tasty. To avoid this it is necessary to coax an owl out of a tree. If that works, the owl will eat the rat rather than the rat eating me. What a relief to see it fly across the screen! Once the rat is no longer a problem I take the shovel. Without that, I might not find the only way to get off of Southfork.

The game has a SAVE feature which is advisable to use before you enter a dangerous situation. If you don't and are killed, you have to start over at the very beginning. Saving your journey can make the completion of the adventure less repetitive as you can load it back in and start at that point.

Leaving Southfork, I find myself on a plane headed for South America. The sound of the jet engines seem to say "hurry, hurry," but after one jump from the plane without the benefit of a parachute, I learned to take more time.

As I travel down the jungle paths, I find that I am glad to have brought all of the items I found at the ranch. Each step seems to bring another obstacle to overcome. These include: monkeys, jaquars, anacondas, hippos (HIPPOS?), curtains, darkness, cannibals, spiders and of course J.R. It seems that he doesn't want me to find the map.

Some clues bring obvious solutions to mind, but other times the answers are learned slowly and quite often the consequences are fatal if you guess wrong. It often takes more thought to solve most of the problems due to the unorthodox solutions. But the magic words required are simple, especially in situations when you are not sure of what to do to whom. Conquering an obstacle just adds to the excitement of anticipating the next.

One inconsistency is the fact that hippos, elephants and lions do not live in South America. However, when the cannibals "request" that you perform a "feat of courage," that fact never seems to come to mind.

The graphics and playability are excellent. This is a game for people of all ages. It is one of the few that seem to have an appeal for the ladies as well as the men. I loaned the program to a friend of mine to get his reaction to it, his wife and a friend spent many hours in solving it. Their daughter, who is seven, learned to play it and was quite enthralled. Playing this adventure will stretch your vocabulary as you try to find the correct synonym to unlock the mystery of each challenge. This is an adventure that the entire family can take part in solving and I highly recommend it. ●

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9.90000	1.25
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10.920	1.49
11.088	1.59
12.000	2.75
13.440	1.00
14.31818	2.49
15.2	1.10
16.00000	1.50
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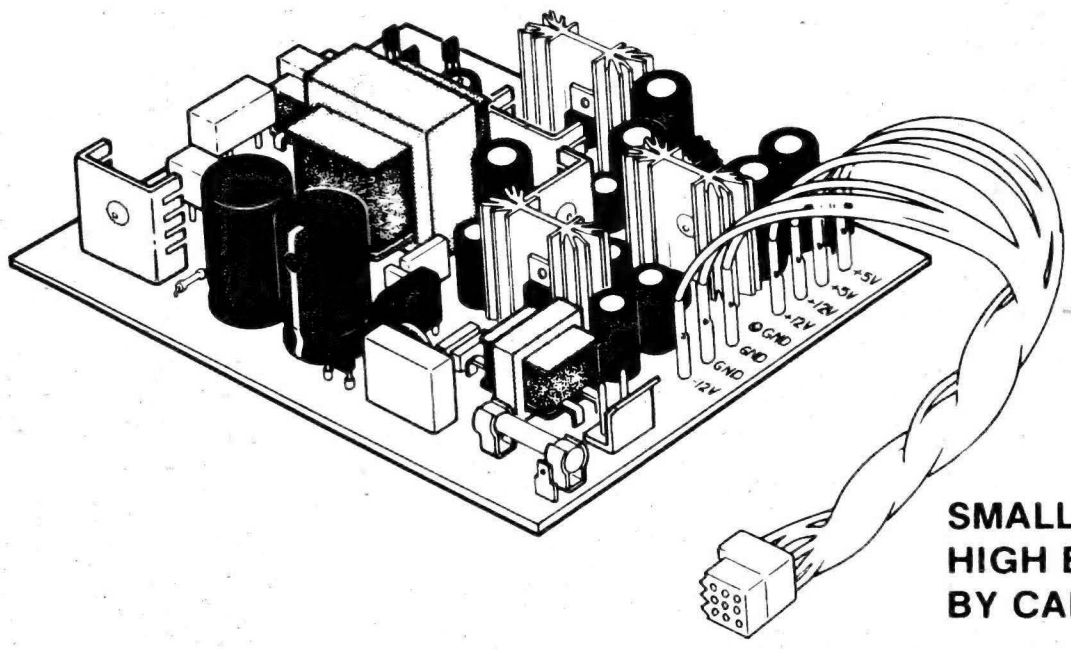

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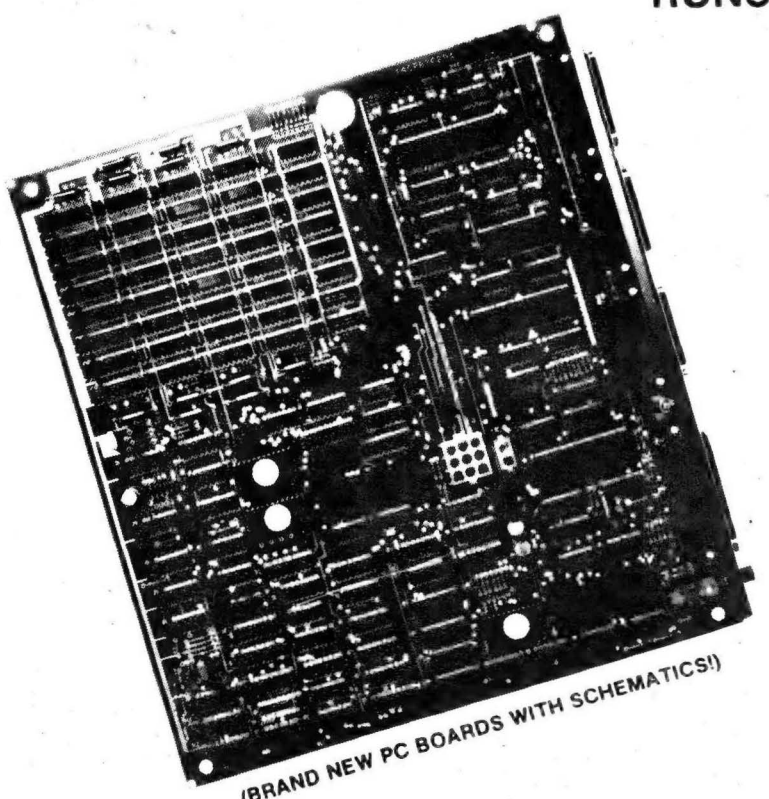

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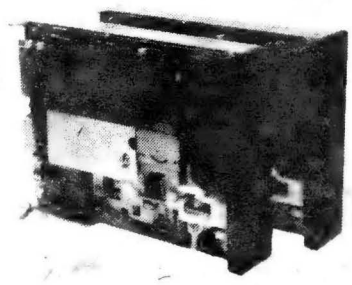

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COMMODORE

Inside The VIC-20/Commodore 64:

Part 12: The KERNAL Jump Table

by Ted Drude

Dear Commodore Owner: Who Are You (And What Are You Searching For)?

I've got a problem. I face it every month, sitting down to write another article. You see, I don't know who I'm writing to. If the Shopper had unlimited resources, we could do a study and find out who the average reader of this column is and what he/she is interested in. (I am boldly assuming that there are some regular readers out there.) We could then target articles to meet the needs of the average reader of the Commodore section. Since that isn't possible, we would appreciate some feedback...

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Please, just drop me a post card or letter c/o the Shopper and let me know what you think about this series. Is the material here too easy to understand, or too hard? Is it interesting or boring? What would you like to see? Stuff on hardware projects, interfacing, BASIC, COMAL, Assembly Language, Forth, graphics, sound, or what? What is not available elsewhere that you would like to see here?

If you do that, I will do my best to answer your letter or card (assuming they are forwarded) with at least an acknowledgement. I am thinking about offering some type of "premium" to those who write. You know, a program or something like that. I can't promise anything, but I guarantee that those who drop me a line will get first notice of anything that comes along.

At the end of this article I am going to say more on this. But first...

More on the KERNAL:

The KERNAL has been the subject of our interest for the past few months. I'll refer you to past columns for the introductions. This time, we'll look at some examples of how it works. We'll examine Jump Table Vectors, and then we will be ready to do some Assembly Language programming of our own!

Understanding The System

A description of how each KERNAL routine works is given in the Programmer's Reference Guides. For a greater understanding of specific routines, you should consult the Reference Guides. I'm not repeating all of that information, since it's readily available. I will walk you through the process of interpreting just what all that information in the Guide means, though, so you can understand it better.

Unfortunately, the Programmer's Guides lack a good conceptual presentation on the KERNAL vectoring system. This leaves a lot of people wondering what the value of such a system is. We will look at that aspect of the KERNAL a little more closely.

For summary, the Jump Table is located in the last page ($FF) of memory in all Commodore computers. It is a standardized interface to the KERNAL ROM "primitive" I/O and file handling routines. If we want to use the KERNAL from a machine language program, there are several advantages in using the Jump Table to access it.

The main advantage is that it saves us from having to develop our own I/O routine. Using the KERNAL, we can safely "borrow" the existing routines in ROM. The Jump Table allows us to treat the KERNAL system as a "black box". We don't have to know all the hardware details of each machine to do console (keyboard and screen) and file I/O. Instead, all we have to know is the exact entry and exit parameters to the KERNAL routines and where the entry vector are located in the Jump Table. Commodore provides us this information through the Programmer's Reference Guides.

Our programs will be more manageable using the KERNAL. For example, we can easily determine if errors have occurred during an I/O operation and try to correct them. The KERNAL routines will tell us what the nature of the error was and then we can take appropriate action. Last month we saw how the Jump Table makes machine language I/O more portable and easier to modify from one model to another.

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Continued on page 132

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Drude

Continued from page 131

"big picture" I have included the Jump Tables for the VIC and 64 in listings 1 and 2. I will be referring to them. These listings can be very useful in understanding the KERNAL. Among other things, the KERNAL ROM primitive routine entry addresses can be found by examining the Jump Table.

How It Works, An Example:

In order to understand it better, let's look at a specific routine entry in the table. Notice that table vector located at $FFED points to the ROM routine that is called "SCREEN". The entry/exit parameters of this routine, the communication registers, and the error returns are all described on pg. 295-6 of the C-64 Guide (pg. 201-2 of the VIC Guide). Let's look at that more closely.

Interpreting the Programmer's Reference Guide

The Reference Guide tells us that this routine, when called, will return the "X,Y" (column, row) organization of the screen in the 6502's X and Y index registers. This is the size of the screen in rows and columns. Therefore, if we JSR to $FFED in a 64, the CPU registers will return with a 40 in the X register and a 25 in the Y register ($24 and $19 in hex). The VIC will return a 22 in X and 23 in Y ($17 and $18).

Now you may think this capability is of limited value but, as the Guide hints, it could be an easy way to determine if our program is running on a VIC or a 64. Also, future machines may include the ability to switch between a 40 and 80 column display. This could be even more useful then. In any case, the Reference Guide tells us the following facts about "SCREEN":

1. It is called by JSRing to the vector at $FFED.

2. The X and Y registers are used to communicate with the routine. That is, the data will be returned through them. (If a routine requires input data in a specific register, it will be listed as a communication register as well.)

3. No preparatory routines have to be called before using this routine. (Not always the case with some routines in the KERNAL.)

4. There must be at least 2 stack entries available for the routine to be successful. (Normally, not a problem.)

5. There are no error returns. (Not much can go wrong with this one!)

6. The X and Y registers will be affected by the routine. (Better save them before "SCREEN", if you don't want to lose what is in them.)

Now, let's look at this information in a little more detail:

Communication Registers:

The Communication registers of each routine may be used to input data to the routine or output data back to the calling program. In "SCREEN" the X and Y registers return data, so they are communication registers for this routine. We have to make sure we observe the correct requirements.

Other registers may be used internally by the routine to do its job, even though they are not used as communication registers. These are the "Registers Affected" that are listed for each routine. They will be disturbed and any data existing in them will be destroyed. If this is a concern to us, we should save these registers before calling the routine.

Even though the Programmer's Guide gives us the exact stack requirements for each routine, we generally do not have to worry about it. You shouldn't run out of stack space by calling a KERNAL routine, unless you are using many, many levels of nested subroutines and saving a lot of data on the stack.

A Note on Error Returns:

Although "SCREEN" doesn't have any "error returns", most KERNAL routines do. There are two methods of detecting errors from the KERNAL.

The first involves calling the "RDSTAT" routine after returning from an I/O operation. This is the general method to use when accessing the cassette deck, the serial bus, or the RS-232 port.

The second method is used by the KERNAL to flag errors during routines involving logical files. This method sets the carry flag of the CPU and puts a number in the accumulator (A). Page 306 (VIC pg. 210) lists the errors that corresponds to the number in A. You can then determine what occurred during the routine.

The Programmer's Guide tells us whether we should poll "RDSTAT" or check for a number in A to detect an error when returning from a particular routine. This is the "Error Return" information. Some routines, like "SCREEN", don't return any errors and are always assumed to be successful.

The Guide gives you a short example program of the proper way to call each routine after its description. This is helpful in understanding how each one works.

Why Worry About The Jump Table?

Looking at the Jump Table listing, you can see that "SCREEN's" starting address is actually located at $E505 in the KERNAL ROM. When we JSR to $FFED all it does is redirect us through a JMP instruction to the actual ROM primitive routine.

Why not JSR directly to $E505 and save a microsecond or two? Here is a simple answer: By going direct we lose too much in portability and flexibility. By JSRing to $FFED instead, we will save a lot of work later on. When we want our program to work together with other software using the KERNAL, when we want to "port" (convert) it to another Commodore machine, or if a new version of KERNAL ROM shows up a JSR $FFED will work fine when a JSR $E505 falls flat. In the final analysis, this outweighs the relatively minimal time and memory costs.

With all of these benefits, it is difficult to understand why a lot of software (even from

Continued on page 134

```
C-64 KERNAL Jump Table:        Routine    Description
-----------------------------------------------------
 FF81 4C 5B FF JMP $FF5B      :CINT      - Init. Screen Editor
 FF84 4C A3 FD JMP $FDA3      :IOINIT    - Init. I/O devices
 FF87 4C 50 FD JMP $FD50      ;RAMTAS    - Test RAM, set screen
 FF8A 4C 15 FD JMP $FD15      :RESTOR    - Restore defaul RAM vectors
 FF8D 4C 1A FD JMP $FD1A      ;VECTOR    - Read/set new RAM vectors
 FF90 4C 18 FE JMP $FE18      ;SETMSG    - Control KERNAL Error messages
 FF93 4C B9 ED JMP $EDB9      ;SECOND    - Send second add. after LISTEN
 FF96 4C C7 ED JMP $EDC7      ;TKSA      - Send second add. after TALK
 FF99 4C 25 FE JMP $FE25      ;MEMTOP    - Set the top of memory pointer
 FF9C 4C 34 FE JMP $FE34      ;MEMBOT    - Set the bottom of memory pointer
 FF9F 4C 87 EA JMP $EA87      :SCNKEY    - Scan the keyboard
 FFA2 4C 21 FE JMP $FE21      ;SETTMO    - Set a timeout on the serial bus
 FFA5 4C 13 EE JMP $EE13      ;ACPTR     - Get a byte from the serial bus
 FFA8 4C DD ED JMP $EDDD      :CIOUT     - Send a byte out the serial bus
 FFAB 4C EF ED JMP $EDEF      ;UNTLK     - Tell a device to UNTALK
 FFAE 4C FE ED JMP $EDFE      ;UNLSN     - Tell a device to UNLISTEN
 FFB1 4C 0C ED JMP $ED0C      :LISTEN    - Tell a device to LISTEN
 FFB4 4C 09 ED JMP $ED09      ;TALK      - Tell a device to TALK
 FFB7 4C 07 FE JMP $FE07      ;READST    - Read the system status word
 FFBA 4C 00 FE JMP $FE00      ;SETLFS    - Set logical file parameters
 FFBD 4C F9 FD JMP $FDF9      ;SETNAM    - Set logical file name
*FFC0 6C 1A 03 JMP ($031A)    :OPEN      - OPEN a logical file
*FFC3 6C 1C 03 JMP ($031C)    ;CLOSE     - CLOSE a logical file
*FFC6 6C 1E 03 JMP ($031E)    ;CHKIN     - Set an input channel
*FFC9 6C 20 03 JMP ($0320)    :CHKOUT    - Set an output channel
*FFCC 6C 22 03 JMP ($0322)    ;CLRCHN    - Set default I/O channels
*FFCF 6C 24 03 JMP ($0324)    ;CHRIN     - Get a char. from the input channel

*FFD2 6C 26 03 JMP ($0326)    :CHROUT    - Send a char. to the ouput channel

*FFD5 4C 9E F4 JMP $F49E      ;LOAD      - Load RAM from an input file
*FFD8 4C DD F5 JMP $F5DD      ;SAVE      - Save RAM to an output file
 FFDB 4C E4 F6 JMP $F6E4      :SETTIM    - Set real-tire clock
 FFDE 4C DD F6 JMP $F6DD      ;RDTIM     - Read real-time clock
*FFE1 6C 28 03 JMP ($0328)    ;STOP      - Check for STOP key press
*FFE4 6C 2A 03 JMP ($032A)    ;GETIN     - Get a char. from the key buffer
*FFE7 6C 2C 03 JMP ($032C)    ;CLALL     - CLOSE all OPEN files
 FFEA 4C 9B F6 JMP $F69B      :UDTIM     - Update the real-time clock
 FFED 4C 05 E5 JMP $E505      ;SCREEN    - Return screen layout
 FFF0 4C 0A E5 JMP $E50A      :PLOT      - Read/set cursor position
 FFF3 4C 00 E5 JMP $E500      ;IOBASE    - Return base address of I/O ports
```

("*" denotes re-directable double vectored routine).

Listing -1—C-64 KERNAL Jump Table

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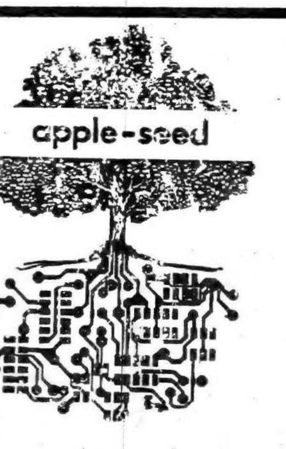

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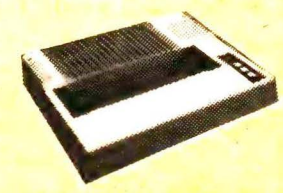

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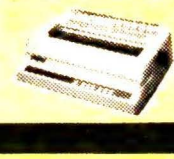

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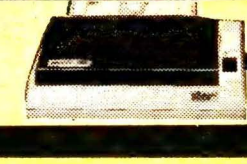

Drude
Continued from page 132

Commodore) still bypasses the Jump Table for simple I/O and file functions. With a little modification, they could be a lot more portable.

For example, the "DOS 5.1" wedge program for the 64 bypasses the Jump Table and jumps directly to the screen printing routine in ROM at $E716, just like our example last month. This keeps it from working correctly with some 80-column software programs. By simply re-adjusting the program to JSR to $FFD2 (with the Jump Table) instead of $E716 (like our previous example), the "wedge" will work with about any software.

Double Vectors - Added Flexibility:

If you study the Jump Table listings closely you will see something interesting. Some of the JMPs (like OPEN at $FFCO) are INDIRECT JMPs to another vector down in the KERNAL vector RAM area ($0131A-0333). Those are the "double vectored" I/O routines that make it easier to modify and customize the KERNAL. There are 12 KERNAL routines that are double vectored through RAM. I have included all this in listing 3. Notice that they are the "logical file" I/O routines. The Lower RAM vector locations are the same for both the VIC and the 64. A 13th vector location is unused any may be user-defined.

If you look at the OPEN vector, you will see that it performs an indirect jump to location $0131A. An indirect jump, you remember, doesn't actually jump to that location. Instead the target address is found there in the normal 6502 Lo-byte, Hi-byte format. This means that if $F34A is Lo/Hi at $031A-031B (which is the normal case in a 64), a JSR to $FFCO will eventually be rerouted to $F34A.

The nice thing about this "double-vector" re-routing is that we can change the lower RAM vector to point to the address of a different routine, perhaps one that we have written. Whenever a KERNAL OPEN call is made, it will automatically branch to start of our new routine, instead of the normal one in ROM. This allows us to modify the function of the OPEN routine rather easily. Not all of the KERNAL routines can be re-vectored like this, but the most important ones can. This simplifies the implementation of custom I/O features or new device drivers.

Although there is a KERNAL routine which will allow us to swap in all lower RAM vectors to new ones we specify, we can also modify them directly. Another routine, accessed through the Jump Table, will restore the default ones. This simplifies the re-vectoring procedure.

You should understand that the KERNAL has grown larger in each successive model of machine. Only a subset of the entire Jump Table is truly universal. Notice that there are a few routines listed for the 64 that do not appear in the VIC listing, namely "CINT", "IOINIT", and "RAMTAS". These are new Jump Table entries that were added to the 64. There are not equivalent entries in the VIC table (or the PET/CBM Jump Tables), even though ROM primitives exist that are similar. This means that these routines are not "downward" compatible. Future versions of the Jump Table may include them. Just don't count on them to be present in older machines.

```
  Vic KERNAL Jump Table:      Routine      Description
-------------------------------------------------------
 FF8A 4C 52 FD JMP $FD52     ;RESTOR      (See C-64 Listing)
 FF8D 4C 57 FD JMP $FD57     ;VECTOR
 FF90 4C 66 FE JMP $FE66     ;SETMSG
 FF93 4C C0 EE JMP $EEC0     ;SECOND
 FF96 4C CE EE JMP $EECE     ;TKSA
 FF99 4C 73 FE JMP $FE73     ;MEMTOP
 FF9C 4C 82 FE JMP $FE82     ;MEMBOT
 FF9F 4C 1E EB JMP $EB1E     ;SCNKEY
 FFA2 4C 6F FE JMP $FE6F     ;SETTMO
 FFA5 4C 19 EF JMP $EF19     ;ACPTR
 FFA8 4C E4 EE JMP $EEE4     ;CIOUT
 FFAB 4C F6 EE JMP $EEF6     ;UNTLK
 FFAE 4C 04 EF JMP $EF04     ;UNLSN
 FFB1 4C 17 EE JMP $EE17     ;LISTEN
 FFB4 4C 14 EE JMP $EE14     ;TALK
 FFB7 4C 57 FE JMP $FE57     ;READST
 FFBA 4C 50 FE JMP $FE50     ;SETLFS
 FFBD 4C 49 FE JMP $FE49     ;SETNAM
*FFC0 6C 1A 03 JMP ($031A)   ;OPEN
*FFC3 6C 1C 03 JMP ($031C)   ;CLOSE
*FFC6 6C 1E 03 JMP ($031E)   ;CHKIN
*FFC9 6C 20 03 JMP ($0320)   ;CHKOUT
*FFCC 6C 22 03 JMP ($0322)   ;CHRIN
*FFCF 6C 24 03 JMP ($0324)   ;CHROUT
*FFD2 6C 26 03 JMP ($0326)   ;CLRCHN
*FFD5 4C 42 F5 JMP $F542     ;LOAD
*FFD8 4C 75 F6 JMP $F675     ;SAVE
 FFDB 4C 67 F7 JMP $F767     ;SETTIM
 FFDE 4C 60 F7 JMP $F760     ;RDTIM
*FFE1 6C 28 03 JMP ($0328)   ;STOP
*FFE4 6C 2A 03 JMP ($032A)   ;GETIN
*FFE7 6C 2C 03 JMP ($032C)   ;CLALL
 FFEA 4C 34 F7 JMP $F734     ;UDTIM
 FFED 4C 05 E5 JMP $E505     ;SCREEN
 FFF0 4C 0A E5 JMP $E50A     ;PLOT
 FFF3 4C 00 E5 JMP $E500     ;IOBASE
```

("*" denotes re-directable double vectored routine).

Listing -2—Vic-20 KERNAL Jump Table

Now that we have a handle on just how the KERNAL system works, we can begin to use it to do our bidding. Next month, I will present some example programs showing you how to do console I/O from the KERNAL. We will also see how to OPEN and CLOSE logical files for I/O. This will open up the power of the KERNAL for you machine language programmers out there!

Where Would You Like To See This Column Go?

As I said earlier, we need

Continued on page 136

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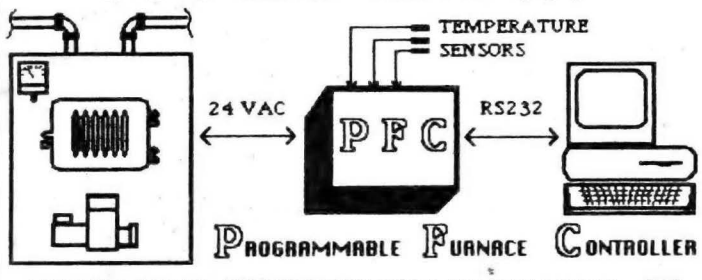

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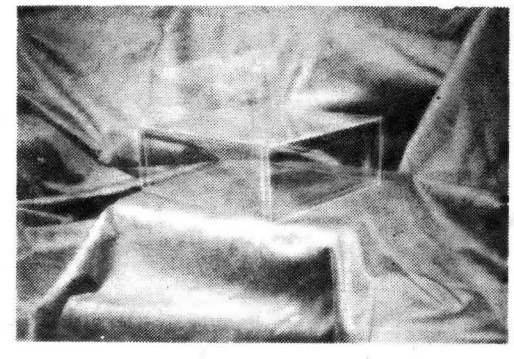

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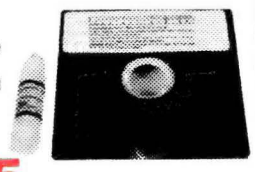

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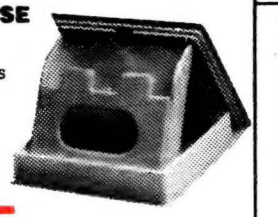

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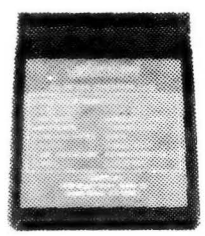

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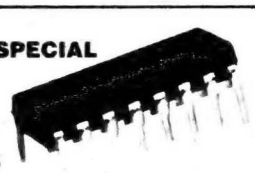

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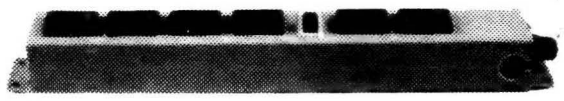

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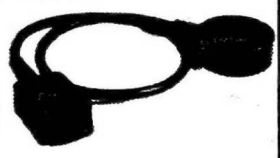

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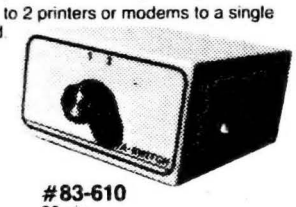

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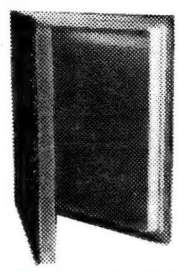

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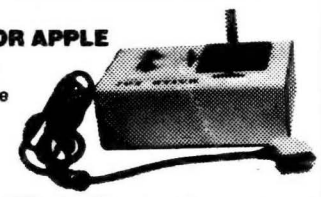

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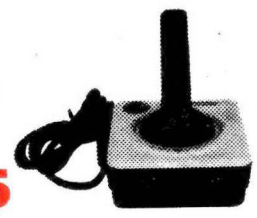

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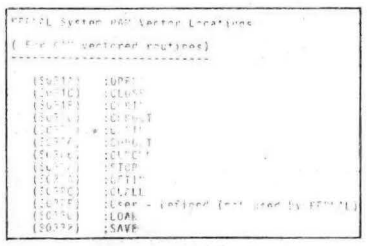
Drude
Continued from page 134

your feedback on where this series should be targeted. I have got some wild ideas for Commodore projects, but I need your help. We can't do everything, so we need to know what you, the average reader, is interested in. Do you want heavy Assembly Language /KERNAL projects, general software development, in-depth hardware projects, or a business oriented project?



(Each location is 16-bit address register and is the target of an indirect JMP. The routine start address should be in the normal 6502 Lo/Hi format.)

Listing -3—KERNAL RAM Vector Locations

I'll Give You Some Examples:

For Assembly Language, let's develop a "general" type project to implement a new "custom" language. How about writing your own version of FORTH? Or implementing a "C" compiler on a 64? We could develop some macros and routines to do high speed graphics and sound. Let me know.

If you are interested in general software development, what is your target? Do you want to write programs for money? Modify commercial programs you already own? Want to know how to market software you've already written?

How about a quality public domain software exchange like the SIG/M system for CP/M? We could review and catalog all the Commodore P.D. software so that you know what's worth getting and what's just junk. If there is enough interest, we could get a true non-profit exchange going. You send in a program to contribute to the library and get a free disk full of software you want. Not a bad deal!

Want to hook up a cheap ($700) 10 Megabyte hard-disk to your 64? How about a 128K RAM expansion (under $100)? Interested in getting CP/M to really be useful on the 64? What hardware projects interest you?

Can a 64 seriously be used in business? What's the best "productivity" software? How can you set up a Commodore system for business use at the lowest cost? What do you look for in accounting software?

Please, write and let me know what you are interested in. This is an open forum for Commodore users. Here is your chance to have input and get this section rolling the direction you would like to see.

The Old Reliable: Word Processing

No matter what the computer system, one of the main applications is always word processing. Good reason. Even the worst word processing (WP) system on any computer (anybody remember "VIC Typewriter") is light years ahead of most typewriters. If you do any text work at all, it is a reasonable excuse for owning a computer.

One of the main justifications for purchasing my 64 was that it was better suited for WP than the VIC-20 I owned. Forty columns and 64K made it possible to do credible text editing without undue pain and frustration. The graphics and sound were secondary. If most 64s are used for WP then let's find out how to do it the best. Do we need 80 columns or not? Which do you prefer: Easy Script, Speed Script, WordPro, Paper Clip, or none of the above? Why?

I, at this point, prefer Easy Script. I can use my cheap User Port/parallel interface with it. Easy Spell works with it (although it has a nasty bug you have to watch for). And, it's very flexible. I haven't found anything I wanted to do with a word processor that Easy Script couldn't do. I have used other WP programs like WordStar, MultiMate and others. I think Easy Script stands up to them rather well, especially considering the price/performance ratio.

If you are interested, we can publish an article on how to construct a cheap parallel interface for Easy Script. It really isn't hard. All the parts are available at any Radio Shack store for under $20. If you can solder at all, you can build it.

For you Easy Script owners, here's a handy hint on making it easier to use: Instead of using the cursor keys to scroll around the screen in the edit or output modes, plug a joystick into port #2. You will find it works much faster and easier than the cursor keys. Some small joysticks can work like a "mouse" with Easy Script. Who says you need a "Macintosh?" See you next month! ●

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* **Printer** - Panasonic KXP 1091 ..... **$310**
* **Nashua** Disks - soft sectored -- SSDD **$15**
  10 to a box, DSDD **$20**
* 5¼" Diskette Tray -- holds 100 disks with lock & key ... **$14**

IBM

* **Color** Graphics Card **$185**
* **Multifunction** Card -- parallel port, OK/256K **$170**
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Disk Controller Card **$125**
Disk Drive - Teac 55B -- ½ ht, direct drive, 320KB, DSDD **$160**

APPLE

* **Z80** Card for II+ & IIe (Microsoft comp.) **$60**
* **80 Column** Card with inverse & cable (Videx comp.) **$80**
* **Graphics** Printer Card with cable (Grappler + comp.) **$70**
* **128K** Ram Card (Titan, Saturn comp.) w 3 disks & manual **$180**
* **Disk** Controller Card (Apple comp.) **$40**
* **Fan** lighted power switch, 2 switched outlets, filter & surge protected **$32**
* **RF Modulator** (RF Mod, cable, & TV switch) **$12**
* **Soft** Switch (Videx comp.) **$18**
* **Joystick** self-centering (Kraft comp.) **$24**
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* **Taitron Modem** II -- 300 Baud, direct connect, auto dial, auto answer, with manual and DOS & CP/M software. (sim. to Micro Modem IIe) **$160**

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Okidata Offers Complete Compatibility With All Apple Computers

If the question is printer compatibility for Apple computers, the answer is clearly Okidata. The high quality, reliable Okidata Microline 92 and 93 printers are now fully compatible with all Apple computers.

The standard version of the ML 92 and 93 have always been compatible with the Apple IIe and II+, and the introduction of Okidata's Apple Plug 'n Play Kit, along with Okigraph I screen dump programs for the standard Microlines made compatibility that much easier. Now, with the introduction of the factory-configured Apple Imagewriter emulating printer, Okidata offers compatibility with the full line of Apple products including Apple IIc, Macintosh and Lisa computers.

The Okidata ML 92 and 93, top-of-the-line in the Microline series, are available in factory configured models to interface with the Apple IIc, Lisa and Macintosh. All that is needed for an instant interface is a computer-specific Okidata cable, which retails for $29.95. The Apple Imagewriter emulating Microline 92 produces correspondence quality text and high resolution graphics with stunning clarity and speed. The Apple Imagewriter emulating ML 93 offers wide-column capacity to accommodate spreadsheet applications. The factory-configured printers are being offered at competitive prices: $569 for the ML 92, $869 for the ML 93.

For those who already own Okidata Microlines, or don't need the factory configured version, any standard parallel Microline printer will interface with the Apple IIe and II+ by using the Apple Plug 'n Play kit, offered by Okidata. The kit, which retails for $99, includes cable, easy to install system interface card and complete instructions.

The new printers, cables and Apple Plug 'n Play kits are available now at all authorized Okidata dealers. The location of the nearest Okidata dealer can be obtained by calling the special toll free hotline number: 1-800-OKIDATA.

Okidata, an Oki America Company, markets the low cost, high performance Microlines, the Pacemark 2410 for demanding business applications, and OKIMATE 10, a low cost, full-color thermal transfer printer for use with home computer systems.

Mention that you read about it in Computer Shopper. ●

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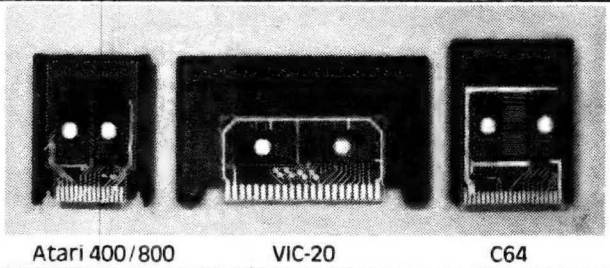

Atari 400/800 VIC-20 C64

- Kit includes plastic case, matching printed circuit board, 16K-byte capacity, complete instructions. Uses 2732 or 2764-type EPROM's. (EPROM's not included).
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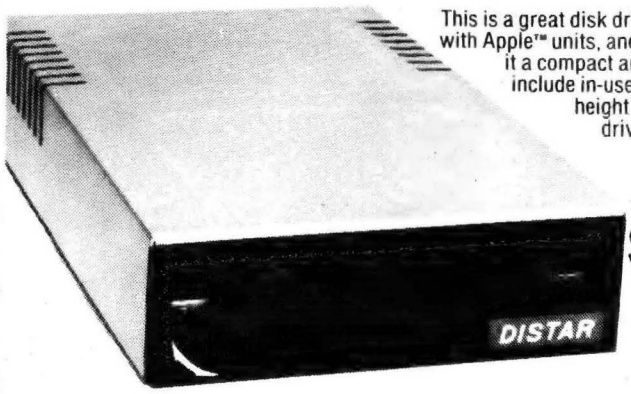

This is a great disk drive for the price. It's compatible with Apple™ units, and the direct drive feature makes it a compact and accurate unit. Other features include in-use zero track sensor • compact ½ height • uses 5¼" floppy disks • direct drive motor • 6 month manufacturer's warranty

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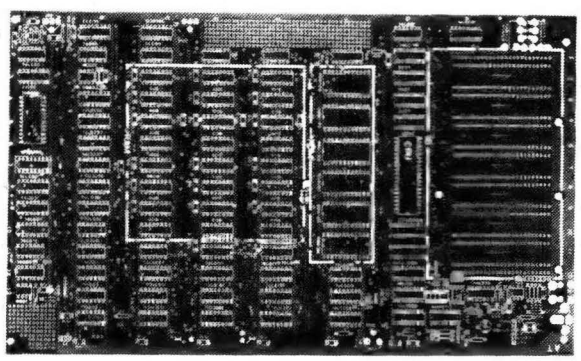

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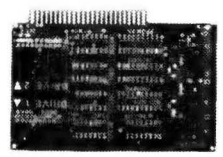

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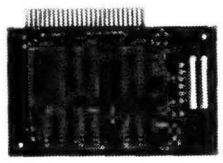

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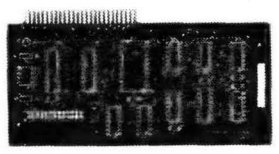

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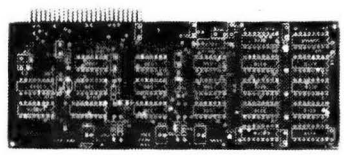

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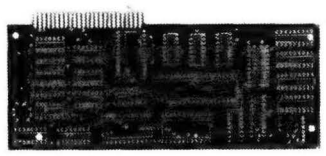

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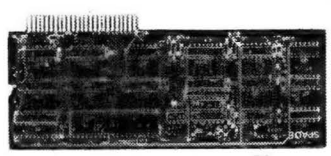

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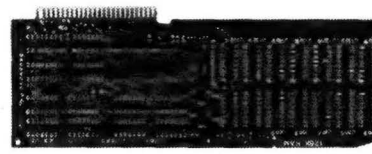

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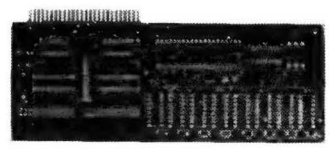

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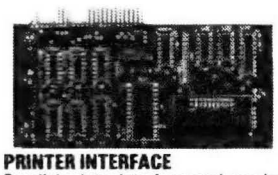

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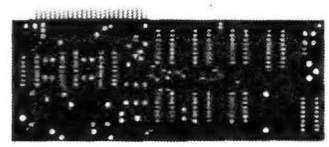

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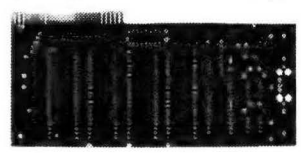

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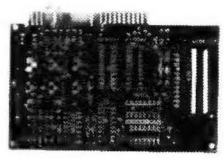

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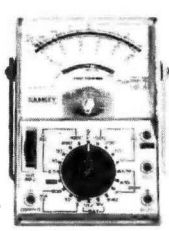

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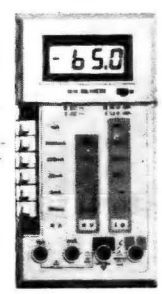

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New Procedure For Registering Your Board

Starting now - All BBS Listings are good for three months. After that period they will be purged unless we receive a Post Card or Letter saying the board is active. In addition, any reader who contacts a board can confirm that it is active, but it is up to the SYSOP to keep us current.

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CBBS Sequoia Computer. Visalia. CA 209-739-1776
DIAL-YOUR-MATCH #26 Clovis. CA 209-298-1328
ABBS Queens. NY 212-896-0519
AMBER ZONE Staten Island. NY 212-967-3789 *24
AMIS, Info New York. 212-767-6633
AMIS, New York. 212-241-8965
AMIS, New York 212-568-0682
BRONX BBS. NY 212-933-9459
BULLET-80 New York. NY 212-740-5680 *24
COMM-80 Queens. NY 212-897-3392 *24
CONNECTION-80 Manhattan. NY 212-991-1664
CONNECTION-80 212-441-3755 *24
FIREFOX Computer World. NY 212-454-1462 *24
NET-WORKS New York. NY 212-410-0949
NYBBLES-80 NY 212-626-0375
PALADIN'S PALACE, FOREM CBB. Queens. NY 212-699-0861 *24
PGA NAT'L LIBRARY New York. NY 212-420-0953
PMS McGraw Hill Books. New York. NY 212-997-4288
SISTER Staten Island. NY 212-442-3874 *24
TCBBS Astrocom. New York. NY 212-799-4649
TCBBS B.A.M.S. New York. NY 212-362-1040 *24
TCBBS Leigh's Computer World. NY 212-879-7698
THE DATABASE BBS 212-772-7167
VINEYARD COMPUTER WORLD, NY 212-357-5679 *24
ABBS Computer Conspiracy Santa Monica. CA 213-829-1140
ABBS Pacific Palisades. Los Angeles. CA 213-459-6400
ALL NIGHT BBS 213-564-7636
AMIS TABBS. CA 213-366-2125
AMIS WVAUG. CA 213-783-8373
BBS B.R. Los Angeles. CA 213-394-5950 *24
CHECKER BOARD Torrance. CA 213-538-9795
COMPUTER CONNECTION 213-657-1799
CONFERENCE-TREE #4 Santa Monica. CA 213-394-1505
CONFERENCE-TREE Kelp Bed. Los Angeles. CA 213-372-4800
DATAMATE Canoga Park. CA 213-998-7992
DIAL-YOUR-MATCH -1 213-842-3322
DIAL-YOUR-MATCH -4 213-783-2305
DIAL-YOUR-MATCH -7 213-840-8252
DIAL-YOUR-MATCH -9 213-345-1047
DIAL-YOUR-MATCH -11 213-242-1882
DIAL-YOUR-MATCH -25 213-842-9452
DIAL-YOUR-MATCH -28 213-764-8000
DIAL-YOUR-MATCH -36 213-452-6111
DRAGONS GAME SYSTEM 213-428-5206
ELECTRIC LINE CONN. Sherman Oaks. CA 213-789-9512
FUNNY PHARM, CA 213-410-0221 *24
FUNNY PHARM, II, CA 213-631-7328 *24
FUNNY PHARM III, CA 213-637-0121 *24
FUNNY PHARM IV, CA 213-822-3553 *24
FUNNY PHARM V, CA 213-631-2911
FUNNY PHARM VI, CA 213-316-6033
GAMENET Palos Verdes. CA 213-541-8039 *24
GREEN MACHINE, Los Alamitos. CA 213-431-1443
GREENE MACHNE FRICASEED CHICEN, Arcadia. CA 213-445-3591
GREENE MACHINE Temple City. CA 213-287-1363
KANDY SHACK -3 Artesia. CA 213-402-1616
KLUGE COMPUTER 213-947-8128 *24
L.A. Interchange Los Angeles. CA 213-631-3186 *24
LONG BEACH COMMUNITY COMPUTER 213-591-7239 *24
NET-WORKS Coin Games Los Angeles. CA 213-336-5535
NET-WORKS Computer World Los Angeles. CA 213-859-0894 *24
NAVATION CO., Los Angeles. CA 213-881-6880
ORACLE North Hollywood. CA 213-980-5643
NET-WORKS Magnetic Fantasies Los Angeles. CA 213-388-5198
NET-WORKS Softwarx Los Angeles. Ca 213-473-2754
PASBBS Torrance. CA 213-516-7089 *24
PMS Los Angeles. CA 213-334-7614 *24
PMS O.A.C. Woodland Hills. CA 213-346-1849 *24
RCP/M RBBS Downey. CA 213-861-2313 *24
RCP/M CBBS Pasadena. CA 213-799-1632 *24
RCP/M RBBS BBS Valley 213-360-5053
RCP/M RBBS Palos Verdes. CA 213-541-2503 *24
RCP/M RBBS Softwar Store Los Angeles. CA 213-296-5927 *24
ABBS Dallas Info Board 214-248-4539
ABBS Teledunjon Dallas. TX 214-960-7654
ABBS Teledunjon I Dallas. TX 214-530-0858
ABBS The Moon. Dallas. TX 214-931-3437, 3436, 3438, 3439
AMIS Dallas. TX 214-680-9018
BBS-80 DALTRUG Dallas. TX 214-235-8784 *24
BULLET-80 Hawkins. TX 214-769-3036
NET-WORKS Apple Grove. Dallas. TX 214-644-5197
NET-WORKS Apple Shack. Dallas. TX 214-644-4781 *24
NET-WORKS Electric Computer Dallas. TX 214-239-5482
NET-WORKS Winesap Dallas. TX 214-824-7455
RCP/M CBBS Dallas. TX 214-913-8274
AMIS BBS. Pennsylvania 215-333-3753
AMIS Pennsylvania 215-250-9471
AMIS Pennsylvania 215-432-9848
BULLET-80 Langhorne. PA 215-364-2180
COMNET-80 North Wales. PA 215-855-3809
HEMRES-80 Allentown. PA 215-434-3998
LEHIGH PRESS BB, PA 215-435-3388
RBBS Pennsylvania 215-398-3937
RBBS Pennsylvania 215-836-5116
TBBS Reading. PA 215-929-5348
ABBS Akron Digital Group. Akron. OH 216-745-7855 *24
ATARI Ohio 216-582-2797
BBS Computer Applications Poland. OH 216-757-3711
BULLET-80 Chesterland. OH 216-729-2769
COMNET-80 Akron. OH 216-645-0827 *24
FORUM-80 Cleveland. OH 216-486-4176
PMS Massillon. OH 216-832-8392 *24
PMS RAUG Akron. OH 216-867-7463 *24
RAILNET BBS Cleveland. OH 216-883-6298 *24
RBBS Lorain. OH 216-282-3423
TBBS of Akron 216-724-2125 *24
UDERGROUND 64 Lorain. OH 216-282-8848 8pm-7am days
CENTRAL IL. CONNECTION Riverton. IL 217-629-7006 *24
NET-WORKS C.A.M.S. Decatur. IL 217-429-5541
TRS-80 Effingham. IL 217-347-5884 *24
AMIS Hart City. Elkhart. IN 219-262-3980
AMIS BBS Parlor City. Bluffton. IN 219-824-5198 *24
MEGA NET BBS Mishawaka. IN 219-259-4366
ABBS Computer Crossroads Columbia. MD 301-730-0922
A.C.C.E.S.S. Computer Crossroads Columbia. MD 301-267-7666 *24
ARMUDIC Computer Age Baltimore. MD 301-587-2132
ATARI Severna Park. MD 301-544-2460
BALTIMORE Com Connection. Baltimore. MD 301-366-3745
BBS IBM 300/450/1200 BAUD. 301-267-4930 *24
BBS IBM Beltsville. MD 301-937-4339 *24
BBS IBM Bethesda. MD 301-460-0538 *24
BBS IBM Gaithersburg. MD 301-251-6293 *24
BBS IBM PC Rockville. MD 301-949-8848 *24
CBBS Gaithersburg. MD 301-948-5717
CONNECTION-80 Gaithersburg. MD 301-840-8588 *24
FUNNY PHARM VII 301-345-5937
FUNNY PHARM VIII 301-299-6202
FUNNY PHARM IX 301-871-7339
FUNNY PHARM X 301-936-2306
HEX Silver Spring. MD 301-593-7033 *24
NETWORKS Laurel. MD 301-953-3341 & 301-792-0305
THE O'ZONE (DYM) Aberdeen. MD 301-575-7225
PMS Baltimore. MD 301-764-1995 *24
PMS Ellicott City. MD 301-465-3176
PMS Pikesville. MD 301-653-3413
PSBBS Baltimore. MD 301-994-0399 *24
RCP/M RBBS Bethesda. MD 301-229-3196
RCP/M RBBS Laurel. MD 301-953-3753 *24
REMOTE NORTHSTAR NASA Greenbelt. MD 301-344-9156
THE HEADQUARTERS Potomac. MD 301-299-9538
TIBBS Washington. DC 301-434-0117
LARRY'S ABBS Newark. DE. Voice 302-731-1583 Modem 302-737-7788
TIBBS Newark. DE 302-322-3999
ABBS Denver. CO 303-759-2625
AMIS Denver. CO 303-758-6233
ATARI CO 303-221-1779
BBS IBM PC Denver. CO 303-773-2699 *24
BARDNET Ft. Collins. CO 303-493-1068
CONNECTION-80 Denver. CO 303-4566 *24
ELECTRIC MAGAZINE 303-340-2473 *24
FORUM-80 #2 Denver. CO 303-399-8858 *24
HBBS Denver. CO 303-343-8401 *24
MOUSE HOLE—ATARI Lakewood. CO 303-988-5562
PINECLIFF RMPM Pine Cliff. CO 303-642-3034
RCP/M CUG-NOTE Denver. CO 303-781-4937 *24
RCP/M RBBS Arvada Elec. Colorado Springs. CO 303-634-1158 *24
RCP/M RBBS Boulder. CO 303-499-9169
REMOTE NORTHSTAR Denver. CO 303-444-7231
NETWORKS ABBS info International NW. Reedy. WV 304-927-1773
NET-WORKS Charleston. WV 304-345-8280
TRI-STATE AREA BBS Huntington. WV 304-429-3918
AUTOBOARD -1 -COMMODORE- Stuart Users' BBS (STUBBS) Stuart. FL 305-286-2509 *24
BBS Homestead. FL 305-246-1111
BBS The Notebook West Palm Bch.. FL 305-686-4862
C-64 BBS1 305-238-2271. This is a Punter BBS
CECIL'S NITE OWL Palm Bch. FL 305-588-0487 *24
CHALKBOARD Hollywood. FL 305-962-6052 *24
COLOR BURST Ft. Lauderdale. 305-525-1192 *24
EL-SHIFT-OH Cocoa. FL 305-783-8905 *24
EMERALD CAVERN Hollywood. FL 305-981-4252
FORUM-80 Ft. Lauderdale. FL 305-772-4444 *24
GREENE MACHINE SPACECOAST 305-268-8356 *24
GREEN MACHINE SPACECOAST 2 305-453-6561 *24
CABLE BOX Pembroke Pines 305-432-5969 *24
MAGIC CITY MICRO (MCM) Magic City. FL 305-271-6644 *24
MAGIC CITY MICRO (MCM) SOFTWARE FORUM Magic City. FL 305-441-2150 (6pm-9am)
NET-WORKS Big APPLE Miami. FL 305-948-8000
PIRATE-80 305-255-8059 *24
QUILL, AMIS BBS Palm Bay. FL 305-724-2303
RAMIK ONE BBS Lake Worth. FL 305-439-8710
RBBS HEATH KIT 305-823-2281 6pm-8am
RBBS SOUTHERN MICRO 305-625-3181 *24
SCAUG BBS Merritt Island. FL 305-453-6998
SPACE SHUTTLE BBS (SSBBS) Satellite Beach. FL 305-777-4714 *24
TBBS Orlando. FL 305-644-8327 *24
TECH-80 305-266-1032 *24
THE BYTE SHOP 305-261-3639. Networks Not BBS
TIBBS West Palm. FL 305-793-8050
TRADE 80 Ft. Lauderdale. FL 305-525-1192
TRADE 80 of Miami 305-947-7930 *24
TRADE 80 Pompano Bch. 305-426-8080 *24
UNICORN, AMIS BBS Palm Bay. FL 305-729-9575
YBBS The Heath Bar 305-940-8795 *24
PET BBSSe Wyoming PUG 307-637-6045 *24
NET-WORKS MAGIE Galesburg. IL 309-342-7178
ABBS Chicago. IL 312-743-3153
ABBS CODE Glen Ellyn. IL 312-537-7063 *24
ABBS Gamemaster. Chicago. IL 312-475-4884 *24
ABBS Illinois Microcomputer. Naperville. IL 312-420-7995
ABBS Lincolnwood. IL 312-764-6502
ABBS Rogers Park. Chicago. IL 312-973-2227
AMIS Bellwood. IL 312-544-7228
AMIS Chicago. IL 312-789-3610 *24
AMIS Lombard. IL 312-620-6441
The BASIC BBS Aurora. IL 312-896-9628 3pm-11pm
BBS IBM Chicago. IL 312-259-8086 *24
CBBS Chicago. IL 312-545-8086 *24
CBBS Chicago. IL 312-876-0974
CBBS Dolton. IL 312-849-1132
CBBS Palatine. IL 312-397-0360
CHICAGO GREEN MACHINE 312-622-4442
CNODE LaGrange Park. IL 312-352-5681
CO-OP BBS Arlington Heights. IL 312-228-1495
CP/M Chicago. IL 312-326-4392
CP/M Chicago. IL 312-338-8827
CP/M Chicago. IL 312-537-7888
CP/M Chicago. IL 312-861-1797
CP/M Downers Grove. IL 312-852-1305
CP/M Glen Ellyn 312-469-2597
DIAL-YOUR-MATCH -39 312-243-1046
HCOM Chicago. IL 312-267-2066
HP1 Palantine. IL 312-397-8308
MAGS Hickory Hills. IL 312-598-4861
MCMS C.AM.S. Chicago. IL 312-927-1020 *24
MCMS Hanover Park. IL 312-289-7619
MCMS L.A.M.S. Round Lake. IL 312-740-9128
MCMS Metro West Database. Chicago. IL 312-260-0640 *24
MCMS P.C.M.S. Wheaton. IL 312-260-0640 *24
MCMS Waco Hotline. Schaumburg. IL 312-351-4374 *24
MCMS Wheaton. IL 312-462-7560
NESSY Chicago. IL 312-773-3308
NET Arlington Heights. IL 312-392-2403
NET 1 Arlington Heights. IL 312-398-0970
NET 1 Chicago. IL 312-545-5866
NET Chicago. IL 312-685-9573
NET Chicago. IL 312-278-7261
NET Lombard. IL 312-627-5138
NET Wheaton. IL 312-260-0748
NET Skokie. IL 312-674-9246
NET-WORKS Chipmunk. Hinsdale. IL 312-323-3741 *24
NET-WORKS North Parks. Chicago. IL 312-745-0924
OCCCS #2 Wheaton. IL 312-588-7917
ONL Chicago. IL 312-648-4867
OT Berwyn. IL 312-795-0871
OT Elk Grove. IL 312-529-1673
PBBS Co-Operative Comp. Palatine. IL 312-359-9450 *24
PCM Chicago. IL 312-376-7598
PCM Midlothian. IL 312-396-1022
PET BBS COMMODORE Chicago. IL 312-397-0871 *24
PMS Chicago Public Library 312-235-3200
PMS Chicago. IL 312-373-8057 *24
PMS Downers Grove/SRT. Downers Grove. IL 312-964-6513
PMS I.A.C. Lake Forest. IL 312-295-3926 *24
RATS Homewood. IL 312-957-3924
RIPCO 1200/300 BAUD. Chicago. IL 312-528-5020 *24
RCP/M A.B. Dick Co.. Niles. IL 312-647-7636 *24
RCP/M AIMS Hinsdale. IL 312-789-0499 *24
RCP/M IBM PC Niles. IL 312-259-8086
RCP/M Logan Square. Chicago. IL 312-252-2136
RCP/M NEI. Chicago. IL 312-949-6189
TBBS Chicago. IL 312-445-4545
TIBB Oak Park. IL 312-848-3669
UNIVERSITY CONFERENCE INFORMATION NET Chicago. IL 312-942-0089
WAUKEGAN PUBLIC LIBRARY SYSTEM BBS Waukegan. IL 312-623-2226
ABBS Detroit. MI 313-477-4471
ABBS Michigan Apple Fone Southfield. MI 313-357-1422
AMIS A.R.C.A.D.E. Sterling Hgts.. MI 313-978-8087 *24
AMIS M.A.C.E. Detroit. MI 313-368-2064 *24
AMIS MACE. Michigan 313-274-3940
AMIS Michigan 313-544-0885
APPLE-GRAM 313-292-0389
BBS Metro Detroit. MI 313-455-4277
BULLET-80 Waterford. MI 313-683-5076 *24
CBM-U Commodore Holly. MI 313-634-2973 *24
CBM-U Commodore Detroit. MI 313-273-9551 *24
CBM-U Commodore Fenton. MI 313-629-8579 *24
CCCC BBS Canton. MI 313-981-5061
DAVY JONES LOCKER 313-764-1837
DIAL-YOUR-MATCH -37 313-736-1398
MC CBBS 313-243-4561 *24
RCP/M Detroit. MI 313-584-1044
RCP/M MCBBS Keith Peterson. Royal Oak. MI 313-759-6569
RCP/M MCBBS TCBBS Dearborn. MI 313-846-6127 *24
RCP/M RBBS Pontiac. MI 313-338-8505
RCP/M RBBS Southfield. MI 313-559-5326 *24
RCP/M RBBS Westland. MI 313-729-1905
SYSTEMS PLUS Flint. MI 313-742-6932
TIBBS Detroit. MI 313-288-0530
TIBBS Oak Park. MI 313-544-7788
TIBBS Warren. MI 313-751-1119
TREASURE ISLAND 313-547-7903
TWILIGHT PHONE 313 775-1649 *24
WESTSIDE DOWNLOAD Detroit. MI 313-533-0254
ABBS Century Next Computers. ST. Louis. MO 314-442-6502
ABBS St. Louis. MO 314-838-7784 *24
AMIS ComputerCave MO 314-432-7034
MIDWEST St. Louis. MO 314-227-7120
NET-WORKS Computer Station. St. Louis. MO 314-432-7120
PET BBS Commodore Comm. Lade. St. Louis. MO 314-625-4576
FORUM-80 Wichita. KS 316-682-2113 *24
TIBBS Wichita. KS 316-681-3167
COLOSSUS-TIBBS SYSTEM Wichita. KS 316-687-4307
FORUM-80 Wichita. KS 316-682-2113 *24
GREAT INLAND SEA APPLE BBS 316-685-1190 6pm-8am
OMEGA BBS Wichita. KS 316-685-8202 SYSOP Donna Molony *24
TIBBS Wichita. KS 316-681-3167
The COCO BULLET Indianapolis. IN 317-291-7827 *24
PMS Indianapolis. IN 317-787-5486
PMS SOFTWARE EXCHANGE Indianapolis. IN 317-251-7796 8:30pm-10am
DIAL-YOUR-MATCH -66 Layfayette. LA 318-233-7472
FORUM-80 Shreveport. LA 318-631-7107 *24
STAR (LINC) BBS Lafayette. LA 318-237-3350
ABBS Apple-Med.. Iowa City. IA 319-353-6528
IBM PC Cedar Rapids. IA 319-363-3314
AMIS Rhode Island 410-521-1998
NET-WORKS Computer City. Providence. RI 401-331-8450 *24
ABBS Omaha. NE 402-339-7809
DIAL-YOUR-MATCH -23 402-571-8942
TRADE-80 Omaha. NE 402-292-6184
LETHRIDGE CAMING SYSTEM Lethbridge. AB 403-320-6923
RCP/M RBBS Computron Edmonton. Alberta. Canada 403-482-6854
BBS IBM Hostcomm Atlanta. GA 404-252-4146
CBBS ATLANTA COMPUTER SOCIETY Atlanta. GA 404-636-6130
ITBBS Riverside. GA 404-471-8824
NOCHANGE Atlanta. GA 404-587-4198 *24
TIBBS Atlanta. GA 404-928-4278 & 404-471-1283
TIBBS Ringgold. GA 404-935-4054
AMIS Oklahoma 405-681-6929
AMIS Oklahoma 405-685-2027
ARMU Oklahoma 405-722-5056
HBBS Oklahoma City 405-848-9329 *24
BBS IBM PC Billings. MT 406-656-9624
AMIS Grafex Cupertino. CA 408-253-5216
AMIS ABBS San Jose. CA 408-298-6930
AMIS T.A.B.B.S. Sunnyvale. CA 408-942-6975
BULLET-80 San Jose. CA 408-241-0769
BYTE BANDITS CLUB TRS-80 BBS San Jose. CA 408-374-3974
COMPUCAT Los Gatos. CA 408-353-1836
DIAL-YOUR-MATCH -56 408-736-7356
NET-WORKS Computer Emporium. San Jose. CA 408-227-0227
PMS Cambell. CA 408-370-0873 *24
PMS Santa Cruz. Aptos. CA 408-688-9629 *24
RCP/M Colossal Oxgate. San Jose. CA 408-263-2588
RCP/M RBBS Data Tech 004 Sunnyvale. CA 408-732-4233
RCP/M RBBS San Jose Oxgate. San Jose. CA 408-287-5901 *24
RCP/M Silicon Valley. CA 408-246-5014 *24
CBM-U Commodore. Galveston. TX 409-763-1970
SAUCERNET Apple College Station. TX 409-693-7908 300/1200 bps
ARMU Pennsylvania 412-655-2652
CBBS PACC Pittsburgh. PA 412-822-7176 *24
DBBS Derry. PA 412-694-5750
PACE 412-754-0800 *24 AMIS
ABS Colortron Computer. WI 414-637-9990 *24
AMIS Atari Wisconsin 414-352-2772
BBS SUE Milwaukee. WI 414-352-2772
BIG TOP GAMES SYSTEM Milwaukee. WI 414-259-9475
CBBS Maude Milwaukee. WI 414-241-8364 *24
EXEC-PC IBM PC Milwaukee. WI 414-964-5160 *24
PET BBS S.E.W.P.U.G. Racine. WI 414-554-9520 *24
RCP/M RBBS Mike's Milwaukee. WI 414-647-0903
S.C.S. ABBS Lt. Suamico. WI 414-434-3253 8pm-7am
TIBBS Milwaukee. WI 414-649-8316
TIBBS Appleton. WI 414-739-5380
TIBBS Freedom. WI 414-788-9730
TBBS Canopus. Milwaukee. WI 414-281-0545 *24
VANMIL Milwaukee. WI 414-271-7580 *24
ABBS Computerland. Fremont. CA 415-794-9314
ABBS Hayward. CA 415-881-5662
ABBS PCNET. San Francisco. CA 415-863-4703
ABBS South of Market. San Francisco. CA 415-469-8111
ARMU Synapse CA 415-527-8276
BBS Living Videotext Menlo Park. CA 415-327-8876 *24
BLUE BOSS IBM PC Berkely. CA 415-845-9462 *24
CBBS Lamda. Berkeley. CA 415-658-2919
CBBS Proxima. Berkeley. CA 415-357-1130
CONFERENCE-TREE -3 Hayward. CA 415-538-3580
CONNECTION-80 Fremont. CA 415-651-4147 *24
DIAL-YOUR-MATCH -10 415-467-2588
DIAL-YOUR-MATCH -17 415-991-4911
DIAL-YOUR-MATCH -56A 415-964-3255
DRUMMER 415-552-7671
KINKY KUMPUTER San Francisco. CA 415-552-8268
MRCBBS 415-968-6501
ON LINE DEPARTMENT 415-334-7555
P. BAY BBS San Francisco. CA 415-775-2384
PMS Pleasanton. CA 415-462-7419 *24
PMS Portola Valley. CA 415-851-3453 *24
RBBS DataTech 006. San Francisco. CA 415-563-4953
RCP/M BBBS Marin County. CA 415-383-0473 *24
RCP/M RBBS DataTech 001 San Carlos. CA 415-595-0541 *24
RCP/M RBBS Larkspur. CA 415-461-7726 *24
RCP/M RBBS Mountain View. CA 415-965-4097 *24
SUNRISE OMEGA-80 Oakland. CA 415-452-0350
SYSTEM/80 San Leandro. CA 415-895-0699
TIBBS San Francisco. Ca 415-355-3092
BBS IBM Hostcomm Toronto Ontario. Canada 416-499-7023 *24
BBS THE BULL Toronto. Ontario. Canada 416-423-3265
NETWORKS Toronto. Ontario. Canada 416-445-6696 *24
PET BBS PSI WORDPRO Ontario. Canada 416-624-5431 *24
PET BBS TPUG Toronto. Ontario. Canada 416-223-2625 *24
RCP/M HAPN Hamilton. Ontario. Canada 416-335-6620 *24
RCP/M MISSAUGA HUG Toronto. Ontario. Canada 416-826-5349 *24
THE CARSWELL CO. Ontario. Canada 416-291-8421
THE COMPUTER MATRIX Springfield. MO 417-869-5294
DGS*EXPRESS Springfield. MO 417-864-8546
THE INFORMATION BOARD Springfield. MO 417-887-6942
ABBS ABACUS II Toledo. OH 419-865-1594
ABBS COMPUTER STORE Toledo. OH 419-531-3845
ARK-NET BBS Little Rock. AK 501-372-0576
PMS FT. SMITH COMP. CLUB Ft. Smith. AK 501-646-0197
RCP/M CBBS LR CP/M UG Little Rock. AK 501-378-7723-continuous
ATARI COMPUTER ENTHUSIASISTS 503-343-4352
CBBS NW Portlane. OR 503-646-5510 *24
CONNECTION-80 PAUG Portland. OR 503-281-7653
FORUM-80 Medford. OR 503-635-6883 *24
TIBBS Gresham. OR 503-661-0408
MICROTEXT 503-754-1376 *24
OARCS Portland. OR 503-641-2798
PMS COMPUTER SOLUTIONS Eugene. OR 503-689-2655 *24
PMS Portland. OR 503-245-2536
RCP/M Chuck Forsberg. OR 503-621-3193
ABBS Baton Rouge. LA 504-291-1360
BATON ROUGE DATA SYSTEMS Baton Rouge. LA 504-926-0181
CBBS Baton Rouge. LA 504-273-3116 *24
LNW BBS SOUTHEAST Baton Rouge. LA 504-291-4331
MICRO-PHONE 504-831-3589
MICRO-PHONE I 504-738-2861
MICRO-PHONE II 504-835-0539
NET-WORKS Crescent City Baton Rouge. LA 504-454-6688
BULLET-80 Alamorgordo. NM 505-434-1096
ABBS ROB ROY COMPUTER Yakima. WA 509-575-7704
RCP/M RBBS Spokane Microcomputer Users Group 509-255-6324 *24
CBBS Corpus Christi. TX 512-855-1512
CONFERENCE-TREE Victoria. TX 512-578-5833
DIAL-YOUR-MATCH 512-451-8747
FORUM-80 San Antonio. TX 512-655-8143
NET-WORKS SPARLIN' CITY Corpus Christi. TX 512-882-6569
SATUG BBS San Antonio. TX 512-494-0285
CONNECTION-80 LAUAL BELE Laual. Quebec. Canada 514-622-1275 *24
DISTRA-SOFT Montreal. Quebec. Canada 514-327-5764 *24
ON-LINE COMUPTERLAND Montreal. Quebec. Canada 514-931-0458 *24
NET-WORKS COMPUTER EMPORIUM Des Moines. IA 515-279-8863
TIBBS Knoxville. IA 515-842-2104
ABBS PIRATES COVE Long Island. NY 516-698-4008
ADVENTURE BBS 516-621-9296
CBBS LICA LIMBS Long Island. NY 516-561-6590 *24
CONNECTION-80 Centereach. NY 516-588-5836
CONNECTION-80 Great Neck. NY 516-482-8491 *24
DRAGON'S LAIR Hewlett. NY 516-374-5071
LION Long Island Osborn Network 516-567-8267
LNW BBS 300/1200 Baud Long Island. NY 516-924-9229
NIC & JOB COST, IBM, VICTOR, TI, TRS80 III & IV, Port Washington. NY 516-944-7007
NET-WORKS PIRATE'S TREK 516-627-9048
STAR TREK III 516-569-0589 *24 run on ATARI 300/1200
TIES Long Island. NY 516-781-1762
TI SOURCE Long Island. NY 516-475-6463
C.H.A.O.S. Lansing. MI 517-373-6788
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DEC Lan-To-Lan Networks Via Satellites

Vitalink Communications and Digital Equipment will cooperatively market a hardware and software product—called TransLAN—that transparently connects local area networks (LANs) via satellites and/or terrestrial lines. LANs connected using TransLAN appear to any LAN station as a single LAN.

The agreement calls for Vitalink to receive a technology license from Digital Equipment as well as cooperatively market TransLAN with Digital to its customers. TransLAN will be sold, serviced and supported by Vitalink.

TransLAN is the result of more than one year's research an development by both Vitalink and Digital. Digital has served as an alpha and beta test site for the Vitalink TransLAN product.

TransLAN is aimed at customers who currently have two or more LANs and need to interconnect them—with a particular focus on distributed work stations for such applications as electronic mail and other office information applications, CAD/CAM, and laboratory/scientific applications.

This new ability to interconnect LANs across the continent, or even around the world, is a major step forward for companies who want to extend their LANs. For example, a brokerage firm can now broadcast stock quotations and new offerings to all their brokers at the same time and immediately receive inquiries and orders from each office. A news service can disseminate simultaneous information to some or all of its clients, giving them the latest updates on critical issues and timely responses to their inquiries, all over one network. A manufacturer can notify all of its sales offices at one time of price changes, special offerings, and promotional campaigns with instant feedback and bookings.

TransLAN Features

TransLAN is a combination of hardware and software designed to connect several Ethernet of IEEE 802.3 local area networks so that they appear as one large network. It lets the networks take advantage of such advanced communications facilities as broadcast satellites. TransLAN provides a transparent interconnection for all LAN stations, regardless of their specific higher-level protocols.

The system consists of bridge hardware and software supplied by Vitalink that connects the LANs with digital transmission networks, including satellites and terrestrial lines.

Using technology developed by Digital, TransLAN "learns" the network's configuration; that is, it remembers which stations are local and which are remote. LAN information intended to be sent to remote sites is automatically forwarded across the digital transmission network in a data-link-layer relay, or bridge, that screens and forwards information to protect the LAN and transmission system from unnecessary traffic.

In addition, TransLAN has extensive network management features that can be accessed from a local console or from a TransLAN management station anywhere in the network.

TransLAN has eight V.35 or RS-232 satellite channels or terrestrial link ports. Port

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DEC Lan-To-Lan
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capacity is 224 kilobits per second. Frame processing rates are 4000 frames-per-second filtering and 1500 frames-per-second forwarding.

Price and Availability

TransLAN sells for $19,450. It includes hardware for an Ethernet/IEEE 802.3 connection, one synchronous I/O port card that can accomodate two V.35 or two RS-232 connectors, a license for the software and one year's software maintenance from Vitalink. First customer shipment is planned by Vitalink for January, 1985.

For more information, contact Vitalink Communications Corp., 1350 Charleston Road, Mountain View, CA 94043.

Mention that you read it in Computer Shopper. ●

Tech Sketch Light Pen And Micro Illustrator

by Cheryl Peterson

Since any computer hardware is only as good as the software that it runs with, my initial reaction to any light pen is "Where's the software?" The Commodore version of Tech Sketch's Light Pen comes with two programs, Micro Illustrator and Lite Sprite. The Atari version comes with Micro Illustrator only. Tech Sketch promises to market a line of secondary level educational programs, as well.

Micro Illustrator is a well-designed, easy-to-use, menu-driven drawing program. Similar to drawing programs that are joystick driven, MI offers 10 different brush types and multiple drawing modes. For the Commodore 64, there are 16 different colors to choose from. Colors may be solid or half-tone.

The program boots up in draw mode with an orange pen. By pressing the space bar, you can go back and forth between the picture in progress and the menu. To choose an option from the menu, you simply point the light pen at it and press the pen's button. Changing colors and choosing a brush are done the same way.

The mirror mode is a real convenience. If you want to create a design simultaneously in all four quadrants of the picture, mirror mode makes it easy. This can be used to create some interesting effects. The magnify mode allows fine tuning your artistry.

Besides the different brushes available, the program also has some drawing modes that simplify creating geometric shapes. Drawing lines, rays, frames, and circles is easy. Filled circles (discs) and filled frames (boxes) are also a snap. When using these modes, there must be a starting point. This is defined by positioning the light pen and pressing the button. By moving the pen around, the dimensions of the figure can be defined. A line on the screen shows the tentative figure dimensions. When the circle is the right size or the frame looks just right, pressing the pen's button will finalize the figure.

A fill mode lets you change the color of any fully enclosed area. By positioning the pen just right, it is possible to change the colors of some lines, as well. For instance, a series of rays around a common point can be changed by putting the pen on any point of the rays. If you don't get it just right though, you'll end up changing the background around the rays, instead.

The erase mode can be very useful in this respect. The program keeps track of everything you've done to your picture since the last time you viewed the main menu. When you go to erase mode, you have the choice of erasing everything or just the last update. By carefully using this feature, several different alternatives can be tried before finally choosing how a particular feature should look.

Pictures can be saved and recalled from disk or printed out with a printer. Although the printout takes considerable time, it does work well. When a printer has to go to dot addressing mode, it will invariably slow down. This is not a reflection of the program.

The last option lets you align the pen more accurately. By having you point to a spot on a vertical line and then on a horizontal line, the program calibrates the pen's response.

In my tests, I handed the pen over to my two-year-old daughter. She thought it was terrific. Her drawings won't soon be appearing in any major art galleries, but she did successfully draw a circle and several straight lines. By borrowing a couple of the neighbor's children, I found that the concept of point and draw works great. The main menu was perfectly adequate for changing pen colors. The older children soon mastered the in-

Continued on page 141

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Peterson
Continued from page 140

tricacies of the special drawing modes. The younger ones were happy just drawing faces.

This is a marvelous drawing package and considering that it comes with the light pen, an excellent deal.

Sprite Designs

The Commodore version is an even better deal, because it comes with Lite Sprite, a sprite editing package. Also menu-driven, Lite Sprite was designed specifically for creating a group of sprites to be used in programs. Having many features of SpriteMaster and other premium sprite design programs, Lite Sprite has only one small limitation. The sprites are designed in "black and white," so you can't view the sprite in multicolors or your perspective color. There is valid reason for this, though.

Lite Sprite anticipates that you are going to create a film strip of different sprites, some very similar to others you've already done. Because of this, Lite Sprite makes it very easy to make changes to existing sprites. It also keeps track of these changes, so they're easy to undo.

To create a sprite, you selectively color blocks within a 24 by 21 matrix that occupies about a third of the screen. Pointing to a block and pressing the pen's button while in plot mode is all that's necessary. That block turns blue. Erase mode "unplots" the blocks (turns them white,) when you select them.

Like Micro Illustrator, Lite Sprite has a main menu from which most of the nicest features are chosen. And, like Micro Illustrator, Lite Sprite remembers where you were the last time you accessed the main menu. Any changes that are made to your sprite are considered "updates." When you come back from the main menu, the blocks will be green instead of blue. Any new blocks that are plotted will turn blue. Erasing these blue blocks turns them white. Erasing the green blocks turns them yellow. Replotting the yellow blocks turns them back to green.

By using this method of defining blocks, the user can easily see what he has changed. The changes are also easily reversible, because the newly added or erased blocks are a different color from those of the original sprite.

In addition to the 24 by 21 matrix, the program also displays the sprite as it would appear in use. Although the image is in black and white, you do get the idea of how your creation would look in your own programs. Lite Sprite will even let you string together a group of sprites and animate them to see what they can do.

Special display modes let you look at your sprites expanded vertically, horizontally or in both directions. Pressing a key will flip the image left to right or top to bottom. You can pick two images and merge them together. Or images can be inverted, reversing the dark and light areas.

The sprite buffer holds 128 frames. Any of these frames can be moved in or out of the work area. The work area also has two temporary stash areas, A and B. Sprites can be moved about between these three areas. Only the sprite in the work area can be edited, but having the two backup areas can really boost your creativity. Not having to worry about damaging a creation beyond repair usually promotes the freedom to experiment.

Last but certainly not least, the program will direct a printer to create a hard copy of all the sprites.

The documentation includes a short section on where the sprites are located in memory,

Tech-sketch light pen and micro illustrator

so those who are interested can take a more in depth look at them. The documentation gives little instruction on what to do with the sprites after you create them. They do recommend the Programmer's Reference Guide for further information.

Using The Pen For Your Own Purposes!

The second half of Lite Sprite's manual is the important difference between this product and others in the same category; the Programmer's Guide. This section is designed to let you use the light pen with other programs that you create or modify. It explains how the light pen works, what memory locations it uses and has four sample programs that illustrate how to read information using the pen. One of these is a sample menu, a highly desirable use for the pen.

Conclusion

With the extras that are offered with this pen, it would be

Continued on page 142

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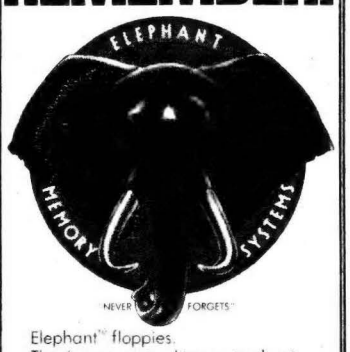

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Peterson
Continued from page 141

impossible for me not to recommend it to anyone who's interested in using one. A toll-free support number and 90-day warranty don't hurt my opinion of the product in the least. My calls to the company were answered promptly and courteously.

The company has announced plans for a line of educational software that when released will really make this a good buy. If the software is of the same caliber as these two programs, this becomes a fantastic product. Even if the software doesn't materialize, this is still an excellent value.

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Commodore 64 Software Reviews

by Cheryl Peterson

Scrolls of Abadon
Access Software
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joystick required

Scrolls of Abadon is a rather Pac-Man like game in which you run around gathering up pieces of a Wizard's Amulate. The object of the game is, of course, to quickly collect all the pieces and make the Wizard happy. Along the way, there are gems scattered about in mazes. When you have picked up all the gems in one maze, a power disk appears that will transport you to another. By pressing the space bar, a master map shows the grids you have already completed and their relationship to each other. By choosing the right power disks to jump on, each grid need only be completed once. The Wizard gets angry when you repeat mazes.

The scrolls alluded to in the title are magic spells which make the journey easier. Until you find the scroll with the appropriate spell, your path is limited. As you traverse each grid, arrows appear on the floor. Since you must walk in the direction of the arrows (until you know the spell), you can't reverse direction.

When the monsters start chasing you, it becomes very easy to walk yourself into a corner. The monsters that inhabit the grid can be overcome if you find the right scrolls. Each scroll tells how to defeat one kind of monster.

One monster eats the arrows, leaving gems in its place. Since the power disks don't appear until all the gems are collected, this makes it extremely difficult to complete a grid. Fortunately, these shy monsters will fly off to another grid if you merely touch them.

All the other monsters are deadly. KITZ follow the arrows, so by clever maneuvering you can avoid them for some time (if you manage to keep from blocking yourself in). There is a hoppy monster called a NIM. And the BEAST! Unleashed by the Wizard if you go against the arrows, it makes a bee-line straight for you and its touch is instant death.

All these can be overcome, if you survive long enough to find the scrolls with the spells. Early on, you find the scroll with the spell that lets you walk against the arrows. But when you use it, the Beasts come after you. To use a spell you must type in the correct word on the keyboard. This is really a pit because it takes your hand off the joystick, so you momentarily lose control of yourself. The spells all last for a specific duration of time or until you change grids. The spells aren't the same for every game, either.

As is usual with Access games, the graphics are great. The baddies are cute little guys. The music is good, but wearing after a while. The person who wrote the music has some musical talent. The mazes are varied so it really is difficult to complete each one and there are several levels of play. The pause feature will hold the game still making it convenient to answer the door or the phone.

If you have extra money lying around, this is a good game to blow it on. If your games' budget is getting tight, you might think twice.

Raid Over Moscow

Raid Over Moscow
Access Software
925 East 900 South
Salt Lake City, UT 84105
$34.95 (disk)
(801)532-1134
joystick required

Like Beach-Head, the other game Bruce Carver programmed for Access Software, Raid Over Moscow has several different scenarios that must be played out before the game is won. The player must master flying two kinds of aircraft, using a bazooka-type weapon, and accurately throwing a disk.

The game starts with a Russian nuclear attack aimed at some major U.S. city. From your vantage in space aboard the satellite equipped with Stealth fighters, you see the launch and the time to impact. You must launch your fighters, penetrate enemy territory, knockout the silos which control the missiles, get to Moscow, invade the Soviet Defense Center and destroy its atomic reactor to prevent any further attacks. Of course, each step of the way enemy forces will try to stop you.

Raid Over Moscow has the great graphics and sound that a Commodore program should have. The program's sprites are excellent. The manipulation of them is perfect and they perform accurately to the extent that they follow the direction in which the joystick moves. Once the instructions for moving your player are understood, the actions of the sprite won't surprise you.

This means the game is easy, right? NO! The first scenario is a killer. As a pilot of a Stealth fighter, you must maneuver your plane out of the hanger. It sounds simple, but it isn't.

The plane is facing parallel to the door, instead of towards it. The controls are difficult to master because you must move the plane three dimensions, simultaneously with inadequate controls (i.e. there are no brakes). The only way to counteract forward momentum is to swing the plane 180 degrees around and fire the back thruster (which is done by pushing the joystick forward). At the same time, the vertical thruster (joystick button) must be used to get the plane off the deck. The left/right motion of the joystick moves the nose of the plane. If that's not enough to keep your mind busy, once you get the plane off the deck and pointed in the right direction, you have to hit a function key to open the bay doors and get out.

So far, no one in my circle of friends or family has succeeded in getting more than one plane out. So it isn't just MY lack of co-ordination. I think Carver should have saved this difficult task for last. Maybe requiring that the player return the plane to the hanger before receiving a successful score.

Fortunately for me, Carver includes a self running demonstration mode that allows the player to take over the game at any point during any scenario. If you thought I was kidding about it being hard to get out of the hangar, the demo can't even do it!

The demo did allow me to get familiar with the other more enjoyable parts of the game, however. By waiting until the other sections showed up, I was able to try my hand at piloting the plane through enemy territory. This was fun, as there were many things to shoot up along the way. (Rather reminiscent of Zaxxon.) You have to look out for the heat seeking missiles coming up on your tail. Extra points if you shoot them down after they pass you.

Knocking out the silos was also lots of fun, because the Soviets send out aircraft to try and shoot you down while you do it. There are windows in the silos, through which you must shoot. Pretty straight forward, except that here again the 3-dimensional element must be taken into account. Unlike with the initial scenario, though, the controls function in a normal manner. Joystick forward and back controls altitude, right and left banks in the appropriate direction, fire bottom fire weapons. Not ter-

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Peterson Reviews
Continued from page 142

ribly difficult, but there is a time element; you need to destroy the missile controls before the rockets destroy the city they are aimed at. One convenience is provided when your fighter is lined up for the shot, it will turn blue. This makes it easier to tell when your plane is at the right altitude.

Outside the Soviet Defense Center, you must use a bazooka-like rocket launcher to blow up the tanks and men between you and the Center. It helps to blow up the towers of the building as well since you get extra points for it. There are five doors in front, one of which leads to the reactor room. It will flash white when it is hit. If the tanks and men have been destroyed, you can then get inside.

Once inside, you must bounce grenades off the back wall and hit the robots tending the reactor. (Sensing your presence, they turn to face you and they are impervious to frontal assault.) By hitting each robot with four grenades, they'll be rendered inoperative. The reactor will go supercritical and blow up because the robots won't be keeping it cool. If you don't destroy the last robot and escape in time, you get blown up too.

This is a fairly difficult scenario, because you must maneuver right and left to keep from being hit by the robots' weapons, while moving the joystick up and down to position where your grenade will hit the back wall. The number of grenades is limited, but by catching the ones that miss and rethrowing them you can conserve a bit.

I wish I could recommend this as whole heartedly as I did Beach-Head, but I just don't think this game deserves it. There are some little things that bothered me a lot. Waiting for the pilot to walk out to the plane just about drove me nuts. (It's a cute graphic, but it really disrupts your concentration.) The immense difficulty with the initial scenario also spoiled the game for me. I like games that get progressively more difficult. This one doesn't. At least, not for me.

Waiting around for the scenarios to cycle by so I could play the ones that were more fun, also bothered me. It seemed like an awful long time to wait.

For people who are really aces with a joystick and can get past the first phase, this game might be worth the price, but this arcade adventure requires tremendous coordination to master and may be very frustrating to less adept players. ●

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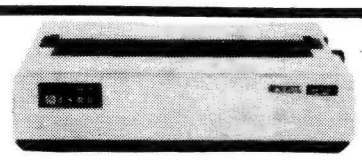

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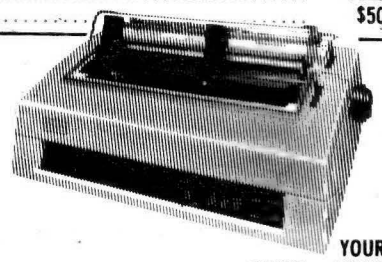

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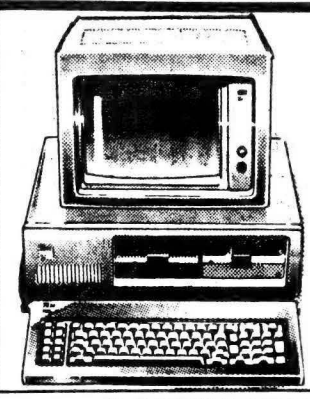

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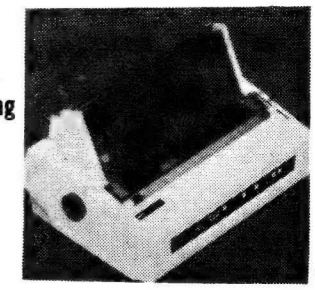

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Stock Market Program Reviews: A Stock Analyzer And A Simulation Game

by Jeff Brenner

Stoctrak

*½

Program Name:
Stoctrak
For the Commodore 64-Diskette
Author:
Thomas P. Gross
Requirements:
Blank disk (for storing data)
Printer (optional)
Manufacturer:
Dynamax, Inc.
600 Water Street, S.W.
Washington, D.C. 20024
(202) 554-4414

Stoctrak, for the Commodore 64, is a program designed to keep records of your stock investments. It allows you to enter up to 300 records for any particular stock (a record contains a stock's information for a particular date), and can store data for up to seven stocks on a diskette.

After you load Stoctrak, you can choose to add a new record to a stock file on your data disk, or you can define a new stock file. Stoctrak requires the following information for a record: the date, high price, low price, closing price, volume, closing average of the New York Stock Exchange, and the volume traded on the NYSE. Once all this information is entered, Stoctrak begins a string of questions which pop up repeatedly throughout the program: "Do you want to change the data?" "Do you want to save the data?" "Do you want to continue with this program?" "Do you want to continue with the same stock?" This type of questioning upon questioning brings back memories of early "user friendly" programs which spit out input verifications such as "Are you sure?" "Are you really sure?" "Type D769RCC2X if you are absolutely certain," etc. While these questions are welcomed by the investor who has never used a computer or a toaster before, for most of us they are a hassle. A much better technique would have been to organize the options in a menu form.

In addition to entering data, Stoctrak lets you list the data, or plot it. Listing the data lets you see all the information you have entered on the stock with which you are working. The listing can be directed to the screen or to a printer. At this point, Stoctrak gives you the option of calculating a moving average. This gives an average of the closing prices for a specified number of days before the displayed date.

If you prefer a more graphical display of the data, you can choose the "plotting" option. You'll note that I put "plotting" in quotes, because in computer terms this option barely fulfills its implied function. After entering the maximum values for the price axis, I expected to see a colorful graph that traced the performance of my stock. Instead, for each date I got an unlabeled horizontal bar indicating volume traded, and, on the same screen line, an asterisk clumsily placed on one of 20 horizontal positions to indicate the closing price. This format is acceptable when listing on a printer, as the program must assume that the printer does not have graphics capabilities. On the screen, though, it is a disgraceful under-utilization of the C64's graphics power. Ironically, the program which I evaluate following this review has a much more comprehensible and attractive multi-color bar graph—and it's only a game. Surely, the author could have done a much better job in this area.

A few other problems exist with the program which should be mentioned. Dates are not put in chronological order by the program. Thus, if you accidentally leave out, say, December 3rd's data, and add it to Stoctrak after December 4th's, the two dates will forever be misplaced. Whenever you list or plot the data, December 3rd's data will follow December 4th's.

The other problem involves error trapping, or more explicitly, the lack of it. Although Stoctrak is compiled BASIC, occasionally, when plotting data, an error message pops up, such as "Division by zero error in 15104" and the program ends. It is then necessary to run the program again. This type of bug is just not acceptable in a program offered for sale.

The 17-page instruction booklet describes the various options of the program—nothing more, nothing less. It does not attempt to give any advice on evaluating the data or identifying trends.

I usually include a rating of the value of a program in my reviews. This rating is based on the price of the program in relation to the features that it offers. However, at the time of this writing I was unable to learn the retail price of this program: calls to Dynamax would not go through. Thus, I cannot include a value rating here. Of course, if this program is of interest to you, you should learn the price and take it into very strong consideration before purchasing it.

Dynamax describes Stoctrak as a program for "technical analysis of stock trends" and claims that it can help investors determine the right time to buy and sell a stock. This is very misleading. No doubt, a countless number of persons will buy this program on the assumption that it will turn them into multi-millionaires. You should realize, though, that Stoctrak is little more than a computerized notebook, and it has enough problems at being just that. The evaluation and selection of stocks is still all up to you.

Ratings for Stoctrak

*Poor
**Fair
***Good
****Excellent

Program Design	*
Practicality	**
Documentation	**
Average	*½

Wall Street

***½

Program Name:
Wall Street
For the Commodore 64
Requirements:
Calculator/Paper/Pen
Blank diskette/cassette to save game data
Price:
$24.95
Manufacturer:
Timeworks, Inc.
P.O. Box 321
Deerfield, IL 60015
(312) 291-9200

Wall Street is a stock market simulation program for one to four players. For a single player, the goal is to amass ten million dollars worth of investments and cash (whew!) in a fifteen-year period. For two or more players, the winner is the one who accumulates the greatest assets in a previously determined number of years.

All players receive one million dollars at the start of the game. A year consists of four quarters, and players can buy or sell investments each quarter. The computer serves as the broker (and automatically takes 1.5% of any transaction for its fee).

In Wall Street, players can choose to put money into any of 12 investments: five stocks; 2 real estate opportunities; minerals; precious metals; the money market; and an Individual Retirement Account (IRA). In addition, special investment opportunities are occasionally available. The stocks are not of real companies, but they have familiar rings to them: BTT is Big Telephone and Telegraph; ABM is American Business Machines; GMC is Generic Motor Company, etc. The user's manual gives descriptions of all the investments and includes each investment's annual growth rate and trend characteristics. This enables players to make intelligent predictions as to an investment's performance.

The many realistic aspects of Wall Street make it not only intensely exciting, but also educational. For example, taxes are inescapable even in this simulation. The tax collector comes around after the fourth quarter of each year, but you can protect some of your income by investing it in real estate or by stashing it into your IRA account. Buying enough shares of a stock can give you a controlling interest in the company, which yields you a yearly salary.

Each player makes transactions through his Trader Detail Display. For each investment, this display shows the price per share, the number of shares owned, the total value of the owned shares, the net percent change of the stock since last quarter, and the estimated annual percentage. Transactions are accomplished through commands which are entered through the keyboard. For ex-

Continued on page 148

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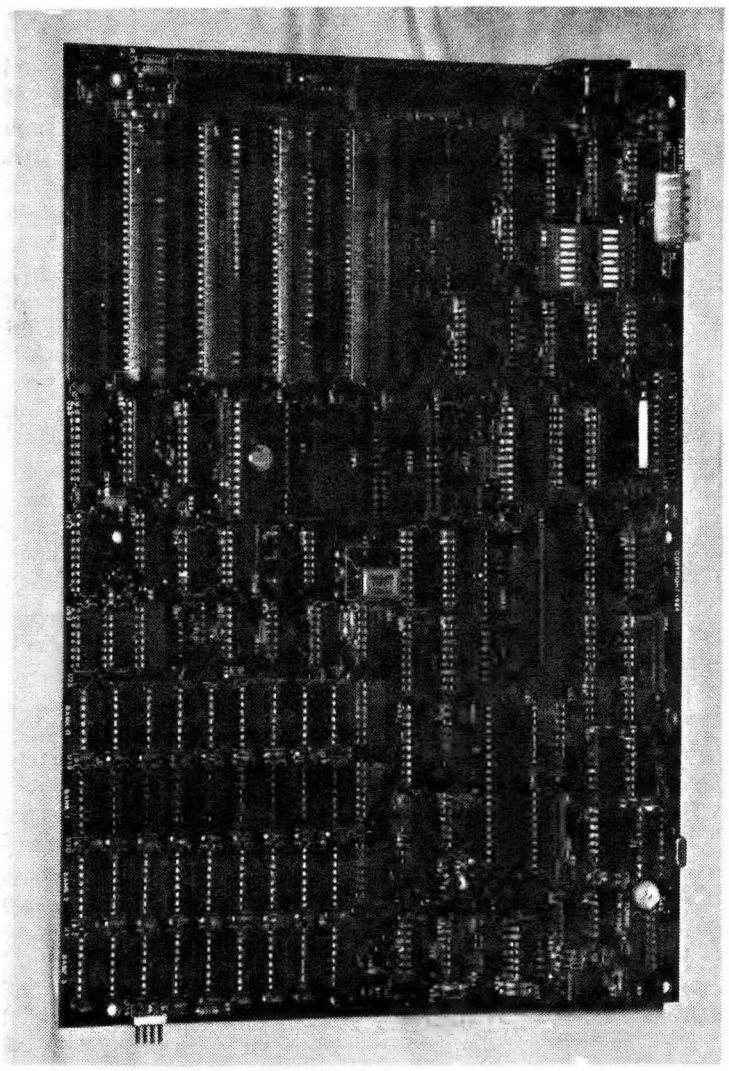

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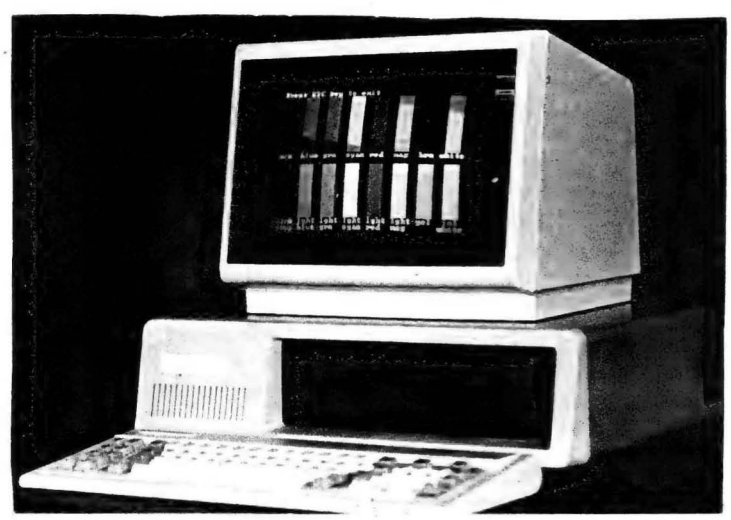

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Brenner
Continued from page 146

ample, to buy 500 shares of ABM, you type: ABM/B/500. To sell them you type: ABM/S/500. To sell all the stock you own or to buy all of a particular stock you can afford, you can use the word ALL in place of a quantity. However, this feature does not work all the time, such as when putting into or taking from your IRA or when buying special investments. Why not, Timeworks? Commands should function consistently throughout a program.

If you want some advice on what to buy or sell, the command "F/A" allows you to consult your financial advisor. Recommendations to buy and/or sell certain investments are listed on the screen. The advisor usually gives helpful advice, but his fee becomes more costly as the game progresses. You can also get a bar chart (free of charge) displaying up to 32 quarters of an investment's performance. The bar chart is of great help in identifying trends.

When all players' transactions are complete, the fun begins. A ticker clacks away as the investments' quarterly price changes scroll across the bottom of the screen. The tension builds as you await the price changes of your most recent purchases.

The game continues, quarter by quarter, until a determined number of years has elapsed. At that time, the player with the greatest assets is the winner.

Mastering this simulation involves the complete understanding of the individual characteristics of each investment. Just as in the real world, to strike it rich, you'll have to be willing to take big risks. This means buying the high-risk investments, such as precious metals and minerals, the prices of which can change dramatically over a very short period. High-risk special investments, such as a treasure hunt or a feature movie, appear from time to time and can also make you a lot of money. On the other hand, expensive medical bills, purchases, or even stolen funds will diminish your wealth.

An average two-player game can take several hours for the recommended 60 quarters, thus the game-save option is a much appreciated feature. The game data can be saved to cassette or diskette after any quarter.

The documentation consists of a 20-page booklet and six duplicate reference cards. The booklet is complete and easy to understand, even for one who is not familiar with the stock market. A summary of all commands and a short description of each investment are listed on each reference card. The reference cards are particularly handy when first learning to play the game, as it makes it unnecessary to continually consult the instruction booklet.

In short, Wall Street is a thoroughly enjoyable simulation game. The many details and realistic aspects of the program make it that much better. And while a single player option is available, it's the multi-player competition that makes this game so exciting.

Ratings For Wall Street

*Poor	
**Fair	
***Good	
****Excellent	
Program Design	***
Amusement Level	****
Documentation	****
Value	***
Average	***½

●

Entrepo's Quick Cassette™ Offers High-Speed Storage For The Commodore Computers

Entrepo Inc. has introduced the Quick Cassette storage system for the Commodore 64 and Vic 20 home computers.

The Quick Cassette is a small, high-speed mass storage system for the Commodore computer and is designed as a replacement for audio cassette storage systems. Entrepo's miniature-sized Microwafer™ storage cartridges are used in the Quick Cassette drive. The drive plugs into the existing cassette port on the Commodore computer.

A proprietary operating system used in conjunction with Entrepo's basic technology enables the Quick Cassette to read data from the tape into the computer 15 times faster than an audio cassette. To the end user this capability means they can load 64 kilobytes of data in about 30 seconds instead of 23 minutes for an audio cassette or 2 minutes for the Commodore disk.

The Quick Cassette for the Commodore 64 has a slow speed read mode that emulates an audio cassette. This enables a user to boot the high-speed operating system from a special Microwafer to the computer. When the operating system is loaded, the Quick Cassette is completely compatible with Commodore Basic and audio cassette commands.

A connector on the drive allows the user to copy programs from either a Commodore C2N audio cassette or another Quick Cassette drive. A light-emitting diode (LED) indicates that the drive is in use.

The Quick Cassette drive is fully computer controlled through its Quick Cassette Operating System (QOS). Its functions include: format, load, save, verify, directory and clean. In addition, it contains a built-in file management utility (FMU) that enables copying to and from audio assette, disk or another Quick Cassette. Integrity of written data is protected by the write-protect mechanism built into the Microwafer data cartridge and drive. The system can also detect the presence of an inserted Microwafer. Microwafers are rugged, endless-loop tape cartridges available in a variety of capacities.

The Quick Cassette drive's suggested retail price is under $85.

For more information about the Quick Cassette, write to Entrepo Inc., 1294 Lawrence Station Rd., Sunnyvale, CA 94086.

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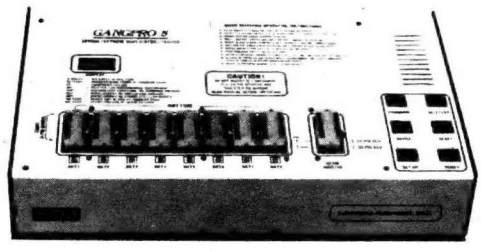

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TEXAS INSTRUMENTS

Randy's Ravings

by Randy Holcomb

This month's column is devoted to reviews of some new software and hardware. First we will examine the **CorComp DSDD Disk Controller Card**, then we will look at some new software from **Technologies Support Group.**

CorComp 9900
Disk Controller
Double Density Controller for the 99/4A
Sugg. Retail $199.95
CorComp, Inc.
1225 N. Tustin Ave.
Anaheim, CA 92807

After many, many months of waiting by loyal TI users, CorComp began shipping their new Double Density Disk Controller, which had promises of increased performance, double the disk capacity over the current TI controller, and a reasonable price. Well, in my case Veit's New Product Law ("Nothing ever works right until Revision E") held true. The story follows:

In the middle of August, I visited a local dealer who had just got in a DEMO model of the CorComp Disk Controller Card. The Card was "supposedly" capable of running disks in double density mode (360 kbytes per disk) and handling up to 4 drives (versus 3 of the TI disk controller) and offered new disk management software and some new subroutine calls for BASIC and Extended BASIC to perform all sorts of strange (but powerful) functions. The disk management software also included an assembly language loader to load assembly language programs without having to resort to the Editor/Assembler module. Well, being somewhat adventuresome I whipped out the plastic and bought it to see if all these wonderful things they were claiming were true. Well, with this demo card I had, those claims were way off base.

For starters, the disk management software was incomplete and many of the functions relating to disk management weren't implemented. Also, it appeared that the controller's inability to handle disk errors properly was a cause for concern: I would initialize a disk, it would verify OK but then would come up with an error later during a non-destructive test; the worst part of that problem was the fact I was using diskettes that were certified double-sided double-density. After a few frustrating days, I finally packed the board off express mail back to CorComp and requested a current PRODUCTION model. After placing a phone call to Anaheim to find out about the delay in shipping the replacement card arrived. Later on I learned that the original card I bought should have NEVER gotten out because of problems with the design. But I got that card, and so did a lot of other people. Happily, it appears that CorComp has gotten the major bugs out of their card and that they have indeed delivered on their specs.

Does the card work? At this time it appears that CorComp has delivered on their promises. Most of the major points addressed have been tested and function as documented. Of course, there have been some pieces of software that for some reason do not want to work with the new card, but for the most part the most popular software titles function with the CorComp card.

Performance Characteristics. Some pretty interesting claims have been as to the speed differential between the CorComp card versus the TI controller. Most noticeable differences between the speeds can be attributed to the fact that there are now 18 256-byte sectors per track in double-density mode versus 9 sectors in single density. (The difference between single and double density lies in the fact that the data in single density diskettes is stored in every other clock cycle written to the disk, wherein in double density the data is encoded into the clock signal.) Also notable is, on the CorComp controller you can select up to 4 head-step rates (selected by a bank of DIP switches inside the disk controller card) depending on the kind of drive you have. Right now on my system I have two Qume 142s and have no problems at the lowest step rate (3ms), and most drives on the market can easily handle this rate. If you've ever wondered why your TI drives sounded so noisy it's because of a high delay step rate. The shorter step-rate for the head will make a marked difference in the performance of accessing files that are heavily fractured ("broken up" in many small segments). In terms of data transfer rate, tests that I conducted between single and double density showed a modest 80% improvement while doing a Bad-blocks scan using the P-system ***FILER***. More exhaustive tests will need to be conducted, but for now it should suffice to say that there is a modest, rather than a tremendous, speed gain with the CorComp card.

Powering-up the System with the CorComp card in place takes on a new format. Instead of the color bar logo the CorComp card literally takes control of your system and displays its own menu, with option 1 being the load of the disk manager, 2 Selecting TI BASIC, and 3 and 4 the options should you have a module plugged in. There is a bug with some cartridges not showing up in this new menu, in which case you hit the space bar TWICE which will turn control back over to the regular ROM monitor in the console to handle those cartridges (Ie, Plato, ROM-only cartridges, etc.)

The Disk Manager. The most talked-about feature of the CorComp Controller is its disk management software. As opposed to the old Disk Manager Cartridge from TI this manager is disk resident (and takes up 98 sectors in image format no less!) and is loaded from Option 1 of the Disk Controller power-up screen. The Disk manager software provides an easier alternative to the clumsiness of having to switch back and forth between the Disk manager cartridge and any other application cartridges you may be using, and is also easier to use. In addition to the normal disk management functions it contains an assembly-language program loader to load standard tagged object files

Continued on page 150

```
DSK1.TIMP                    Page 1 of 2
  22 Files   Free 666   Used 774

CMD Filename   Size     Type          P
--- ---------- ---- ------------      -
 N  ASSM1        33 Program           U
 N  ASSM2        20 Program           U
 N  BSCSUP       15 Dis/Fix   80      U
 N  CHARA1        9 Program           U
 N  CHESS         7 Dis/Var   80      U
 N  DEBUG        32 Dis/Fix   80      U
 N  DISASMBLR    30 Dis/Fix   80      P
 N  DISKFIXER    34 Dis/Fix   80      P
 N  EDIT1        25 Program           U
 N  EDITA1       33 Program           U
 N  EDITA2        6 Program           U
 N  FORMA1       33 Program           U
 N  FORMA2       15 Program           U
 N  MANAGER      98 Program           P
 N  MPBASE       41 Program           U
 N  MPCHAR        9 Program           U
 N  MPCHAR1       9 Program           U
 N  MPDATA       33 Program           U
  Turn Page with CTRL E - CTRL X

DSK1.TIMP                    Page 2 of 2
  22 Files   Free 666   Used 774

CMD Filename   Size     Type          P
--- ---------- ---- ------------      -
 N  MPHLP       158 Int/Fix  128      U
 N  MPINTR       33 Program           U
 N  OVERLAY      31 Int/Fix  128      U
 N  TE3          68 Dis/Fix   80      U
  Turn Page with CTRL E - CTRL X
```

Figure 3— Copy/Rename/Delete

```
File Utilities
Select Option: 2
  1. Copy/Rename/Delete
     Change Protection

  2. Load and Run
     (Assembly file)

Drive No. : 1
Disk Name :
Free                Used

File Name :

Program Name :
```

Figure 2 - Load and Run Option Menu

```
DISK MANAGER V 2.1
Select Option:

  1. File Utilities

  2. Disk Utilities

  3. Disk Tests

  4. Configure Manager

Written by Steve Mildon
```

Figure 1 - Disk Manager Main Menu

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Holcomb

Continued from page 149

without having the Editor-/Assembler cartridges, and a Configuration manager, which allows you to establish defaults for your drive configuration and other parameters, such as sector interlacing and a turbo option (kills read-after-write verify during copy operations, which dramatically improves both file and disk copying). Rather than attempt to try to explain how the manager worked you can examine the Figures presented in the article for a sample of the flexibility that the CorComp Disk manager provides.

Caveats. Remember Veit's law that I quoted earlier? Well, there's at least one anomaly with the CorComp card that is different in implementation than the TI controller and it bothers me. The problem is during initialization of disks. When you hit a bad sector during the verify phase of an initialize disk with the TI controller it would index the head and re-position itself several times in order to attempt to re-verify the sector. If the sector was bad it would flag the sector as bad, allocate it and continue on verifying the rest of the disk. The CorComp card, however, goes off the deep end when it slams into a bad sector and marks ALL subsequent sectors as allocated from the point of the error and homes the head. This problem in error handling was confirmed when a utility program (Floppy-Copy, which will be reviewed next month) which relied on "Phunny sectoring" for its copy-protection wouldn't run. So far I have had very few disks that have shown up with errors, but the point is that if a device that is supposed to be compatible with the 99/4A it should be upward-compatible and act accordingly (which it fails in this case; however, for most user applications it is insignificant). Other quirks: You can use your old TI Disk Manager II cartridge but it will not be able to copy CorComp's own Disk manager software. Also, initializing a disk in double-sided double/density mode using the DM II cartridge seems to take FOREVER.

A special prompt comes up during initialization of a disk using the CorComp manager which asks if you want to install the manager on the disk you are initializing.

Should YOU Buy The Card? Yes, if you do not intend to dump your system for a while and/or you are in a disk storage crisis. If you choose to purchase the card; here are some things you may want to do PRIOR to actually getting the card: (1) Find a dealer who has or is willing to PRE-TEST the card. There may still be a number of the pre-production models loose, so do some checking around. (2) If your disk drives are over a year old, have them PROFESSIONALLY cleaned and aligned and checked AT DOUBLE DENSITY. This will insure that if any problems exist that they will be with the controller card or media and NOT your drives. (3) Use media that is CERTIFIED DSDD. Though it may cost a few cents more it's worth having media that is up to spec than losing your data to questionable media. (You're also reading one of the best places for finding the BEST prices on diskettes, too!) Finally, once

Continued on page 151

Disk Utilities

Select Option: 4

1. Catalog
2. Copy Disk
3. Rename
4. Initialize

Drive No. : 1
Disk Name :
Free Used

Tracks/Side : 40
No. Sides : 2
Density S/D : D

Figure 4 - Disk Initialization Menu

New Multi-User Multi-Tasking Family Offers High Performance

SMOKE SIGNAL announces a wide range of 32-bit, UNIX-based computers with disk capacities up to 150M bytes. Dubbed VAR/68K, the desktop systems are for the benefit of value-added resellers, systems integrators, OEM's and end users.

Six levels of fully-integrated systems are priced as low as $7900 in unit quantities; 40% lower in multiples. Each family member is designed for maximum performance and efficiency, incorporating 32-bit 68008 microprocessors and UNIX-compatible REGULUS operating systems.

Flexibility is a major feature of the VAR/68K family, which handles multiple users more efficiently, due to the superior memory-sharing and disk-swapping capabilities of REGULUS. Multiple users require only a single image of any shared program. Applications and data are swapped automatically between memory and disk, allowing multiple users to run programs which would otherwise exceed available RAM. Disk files are buffered in cache memory in order to speed up I/O operations.

VAR/68K systems incorporate automatic task-switching hardware that minimizes the time necessary to go between supervisor - and user-operating modes. VAR/68K's dynamic address translation feature incorporates a high speed memory design that eliminates wait states. Each segment of memory can be protected against write and execute operations, or completely protected against any access at all.

External DMA transfers are executed at rates up to 2M bytes per second and programmed I/O operations are executed at speeds up to 1.6M bytes/sec. All computers in the family contain proprietary hardware that allows I/O processes to run at an even, steady rate, even during external memory addressing.

Minimum configuration for a VAR/68K consists of the computer, a single terminal with keyboard, 1M byte of flexible disk, 5M bytes of hard disk, eight RS-232C serial ports, a Centronics-type parallel port and REGULUS operating system.

Fully-configured systems include 1M byte of RAM, 150M bytes of hard disk, 60M bytes of ¼-inch streaming tape backup, 16 serial ports, and four 8-bit parallel ports.

Single-unit prices range from $7900 to $25,000, depending upon configuration. Delivery is quoted at two to four weeks ARO.

Smoke Signal specializes in the design, development, manufacture and marketing of multi-user/multi-tasking computer systems, with seven years experience in Motorola-based hardware designs and four years experience in UNIX-type operating systems.

For further information contact Smoke Signal, 31336 Via Colinas, Westlake Village, CA 91362.

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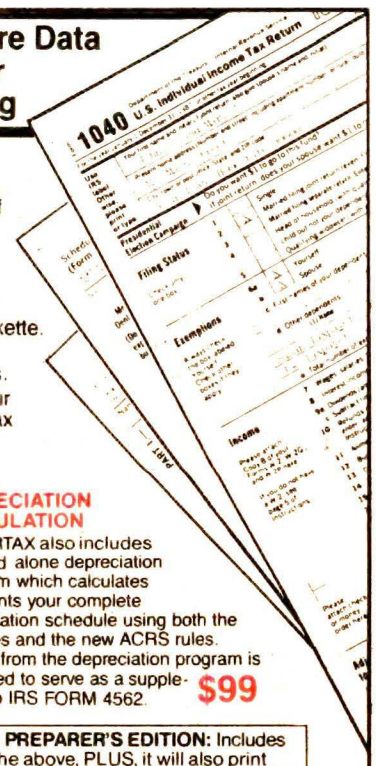

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Holcomb
Continued from page 150

you have the card, burn the card in your system for a while and note any erratic operations. If after several hours of use if all seems well then you probably have a keeper. CorComp's controller warranty is 120 days.

The Documentation, written by W.R. Mosied and Craig Miller, does a nice job explaining the functions of the controller, the disk manager software, the Tool Shed Utilities (VDP Reads and writes, VDP register routines) and includes a nice memory map for the 9918A VDP and the BASIC/Extended BASIC environment. The disk that comes with the controller contains many demo programs that show how to use the tool shed utilities so I won't bother repeating them here. All in all, the CorComp Disk controller card, with all the hoopla and false starts, appears to be all that any TI 99/4A user will need for quite a LONG time. It will be interesting to see how (and when) CorComp can top this one. (Egads, I may have to eat my own words after all.)

Multi-Sort
Pro-Mod I
Auto-Type
Math-II
Sketch-It
Technologies Support Group
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Spencer, MA 01562

These new releases from TSG are some of the kinds of things you may find useful on some occasion: Multi-Sort, which is a generalized data management program for maintaining things such as mailing lists and other entities in a numeric sequence; Auto-Type, for running off quickie one or two page letters live to your printer if it prints the characters live as opposed to buffering them (like the Smith-Corona TP I); Pro-Mod I, which allows an Extended BASIC programmer to do some pretty wild things to programs in MERGE format, like delete types of commands, global search/replace, delete single/multiple lines, insert lines; and for PROGRAM format files it can extract portions of programs and Downconvert

```
                Configure Manager

Drive Configuration

Drive 1              Drive 2
Tracks/Side : 40     Tracks/Side : 40
No. Sides   : 2      No. Sides   : 2
Density S/D : D      Density S/D : D

Drive 3              Drive 4
Tracks/Side : 40     Tracks/Side : 40
No. Sides   : 2      No. Sides   : 2
Density S/D : D      Density S/D : D

  From                 To
  Drive No. : 1        Drive No. : 2

Output Configuration
RS232/2.BA=9600_____________________
--------------------------------------

Screen Color: 5     Text Color  : 16

PRESS CTRL X FOR NEXT PAGE
```

```
                Page 2 of 2

Single Density Interlace : 7
(1-10)

Double Density Interlace : 10
(1-11)

Enable TwAb◆ Option Y/N  : Y

SAVE CONFIGURATION TO DISK Y/N : Y

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Figure 5—
Disk Configuration Manager Menu

Continued on page 152

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Holcomb
Continued from page 151

an Extended BASIC program into a Basic program (break apart multi-line statements.) The other two programs, Math II, and Sketch-it, are designed to perform as a programmable calculator and an electronic easel, respectively. At the time of this writing I have used Multi-Sort to the point where I can honestly review it. Watch for the others to be reviewed in the next issue.

Multi-Sort is an in-memory data management system which is useful for small data bases of less than 250 times whereby you can maintain a mailing list in zip-code order, a customer list, inventory list, etc. The program itself is rather straightforward in its operation and can be used with little difficulty. When it comes to the Zip Code, the program has problems handling a 9-digit zip code with an intervening hyphen; it appears that it uses the last 5 bytes of the string that it uses to store the zip for the sort. (A simple fix can cure this problem.) I have used Multi-Sort to make mailing labels for all the TI User's Groups, but my labels weren't the same size that Multi-Sort was programmed for (the size of the label wasn't mentioned in the documentation; so I popped the protection and made a local patch to handle the labels I was using). The documentation is unique in the approach that it takes a conversational air, rather than the demonstrative vein, but in some areas it lacks the necessary technical detail that the latter format gives. The program works, but it's got some rough edges, so my advice is if your local dealer has it, check it out if you're in the market for such a utility.

Quick Shots: From the Wichita area comes word of a multifunction card kit for the 99/4A that sits in the PEBox that gives you a real-time clock, temperature probe and a DC voltmeter, all for under $100. Watch this column for a review of this new item, as well as the latest new items for the TI world.

Next Month: More TSG Software and a review of several sector-copy utilities for the 99/4A. ●

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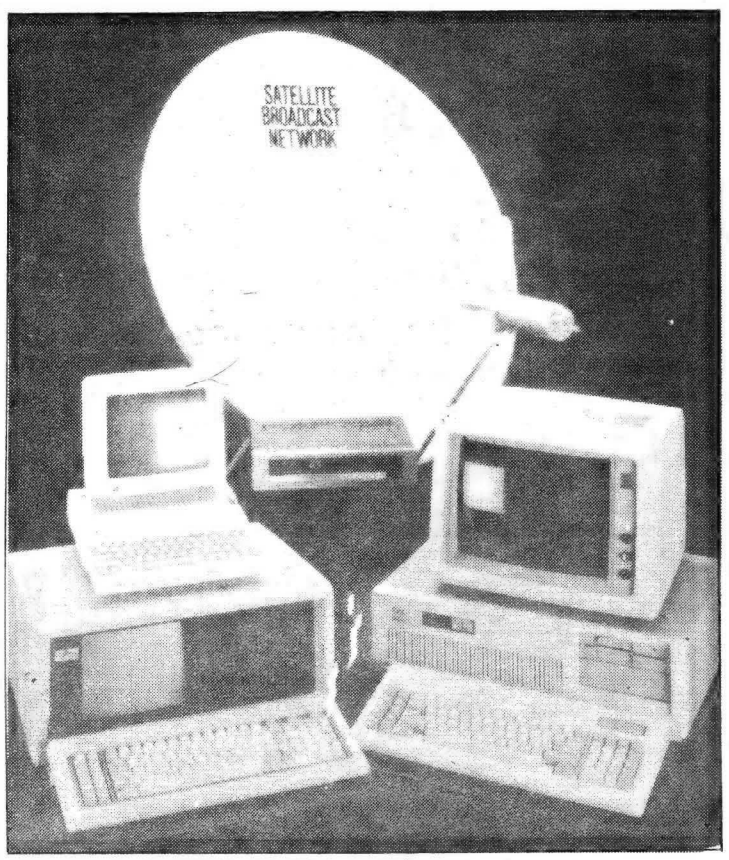
Other features of the SBN Service include multi-channel reception capability and tiering, allowing subscribers to satisfy a broad base of data and software interests over dedicated channels.

With the information explosion of the data base industry and popular demand for

Continued on page 153



SBN introduces a compact, highspeed, low-cost 12 GHz satellite receive system for transmission of computer data to PC owners.

SBN continued from page 152

business and personal computers, all but the largest corporations are still locked out of the data vault by the prohibitive costs on space age technology and by expensive land-based telephone links which no longer keep pace with the demands of satellite-speed information.

Satellite Broadcast Network has integrated satellite communications and computer state-of-the-art technology with the billion dollar data base industry. By eliminating the telephone system of relaying electronic information, Satellite Broadcast Network plugs the personal computer directly into an unlimited information marketplace.

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With up to 768 Kbytes of RAM, the Pro-Lite can easily accommodate complex integrated software packages such as Ashton-Tate's™ Framework™. The large-memory capacity will allow Pro-Lite to take advantage of future expert system and natural language products that are currently emerging from TI's work in artificial intelligence.

The entry-level configuration of the Pro-Lite computer includes 256 Kbytes of memory. Its central processing unit consists of a 16-bit 80C88* microprocessor, with an 80C87* numeric co-processor available as an option.
(* CMOS version of the 8088 & 8087 microprocessors)

The 10.5 pound Pro-Lite has a single, industry-standard 3.5 inch floppy disk drive. Diskette storage capacity is 720 Kbytes -- about twice the capacity of most desktop PC diskettes. With a unique PC interface cable, Pro-Lite can exchange data files with other members of the TI Professional Computer family and the IBM PC product line.

The modular design of the Pro-Lite computer allows users to easily configure a system that meets their needs. Through an expansion box that attaches to the back of the Pro-Lite, either a second disk drive or a battery pack -- or both -- can be added. In addition, an internal 300 baud modem is available as an option.

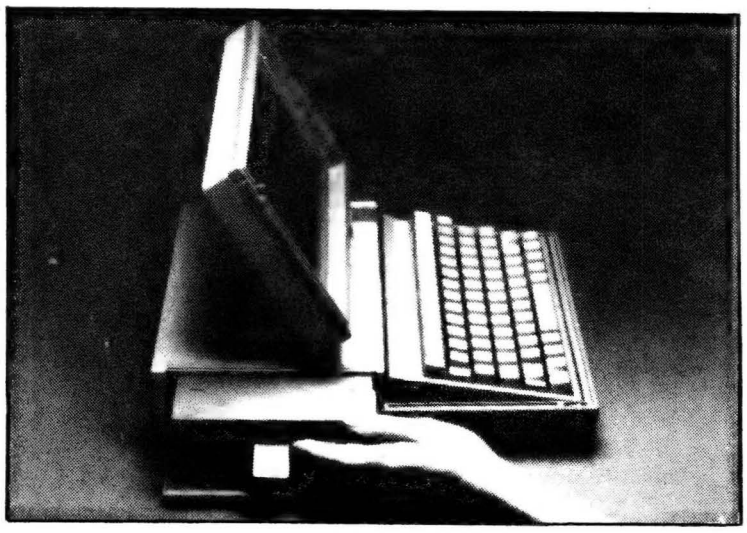
The Pro-Lite modem plugs into one of the two internal option slots. The remaining option slot can accommodate one of the following: an RS-232 synch/asynch interface, an external monitor (color or monochrome) interface, or programmable Solid State Software™ modules for application-specific needs.

An external parallel port for connecting a printer comes with the basic unit as standard. The TI Pro-Lite computer has an optional 45 character-per-second thermal transfer printer that uses either plain or thermal paper. Pro-Lite is also compatible with most other leading printers, including the T.I. OMNI 800 series of microprinters.

The keyboard has 79 full-size, full travel keys in a typewriter-style layout. It includes 12 programmable function keys and an embedded numeric keypad for use with calculator, spreadsheet, and data . base management software.

With 256K bytes of Random

Continued on page 154



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TI's New Pro-Lite
Continued from page 153

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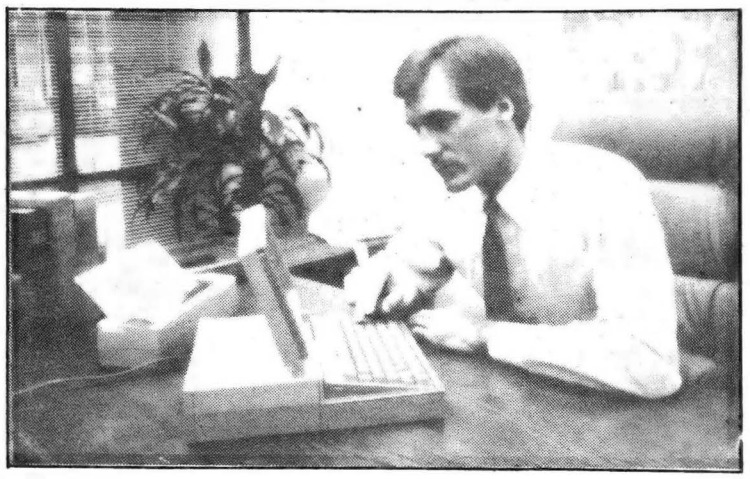

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TI's Personal Consultant™ Software Extends Artificial Intelligence On TI Professional Computer Family

An expert system development package that allows software developers to design and deliver expert systems on the TI Professional Computer has been announced Texas Instruments. With TI's new Personal Consultant development tools, programs can be designed to help solve problems by using some of the same techniques used by human experts. "Rules of thumb" developed from experience and the ability to work with ambiguous or uncertain information are examples of capabilities that will differentiate Personal Consultant applications from conventional software. In addition, applications developed with Personal Consultant can provide the end-user with an explanation of the program's reasoning and recommended action.

"TI is committed to bringing AI technologies into practical, wide-spread use. This has already been demonstrated by our introduction of speech and natural language development tools, as well as, end-user products incorporating these technologies," said Eric Jones, president of TI's Data Systems Group. "The introduction of Personal Consultant establishes Texas Instruments as a leader in implementing expert system technology on an affordable delivery vehicle—the desktop computer. This technology will bring a whole new dimension to the way professionals can use and benefit from personal computers."

The Personal Consultant development tools can be used to prototype and develop applications in diverse areas such as tax and investment counseling, loan analysis and approval, automotive problem diagnosis, and insurance policy and rate selection.

The development package contains all the features necessary for a designer to prototype and develop sophisticated commercial applications that would be difficult and costly using conventional programming techniques. The new package will pave the way for a new generation of software products based on technologies derived from research in artificial intelligence.

"In addition to helping a professional make more effective decisions, Personal Consultant expert systems can co-exist with the hundreds of MS™-DOS compatible business and scientific software products available for the TI desktop and portable Professional Computers," Jones continued. "This combination greatly enhances the computer's value and expands the market that will be able to benefit from expert system technology."

A designer using Personal Consultant software can develop an expert system incorporating as many as 400 production rules on the TI Professional Computer. A production rule specifies the actions or steps taken by the program in a particular situation. Larger expert systems encompassing more production rules can be adapted to run on the TI Professional Computer when developed on a larger, higher-capacity computer system.

Personal Consultant software interacts with an end-user through a question and answer dialogue. For ease-of-use, the system uses a window-oriented, cursor controlled point-and-select technique, allowing a user to select from a list of alternatives instead of memorizing numerous commands. In addition to pointing with the cursor, selections from lists can be made by typing only the first letter, further minimizing keystrokes.

One of the unique features of an application developed with the Personal Consultant package is its capability to handle uncertain or imprecise data. The use of certainty factors allows the system to determine and state the degree of confidence for a particular conclusion. The TI Personal Consultant system can also explain its line of reasoning; the user can ask why a particular question was asked or how the system reached its conclusions. This allows the user to accept,

Continued on page 156

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TI's Personal Consultant Continued from page 154

or have a basis for rejecting the system's recommendations.

TI will be offering the Personal Consultant development package through a specialized direct-sales channel aimed primarily at universities, research organizations, large corporations with internal AI training and development needs, and independent commercial software developers. Quantity-one pricing for the Personal Consultant expert system development tools is $3,000 and includes the Personal Consultant development software, two sample knowledge bases, IQLISP™ Programming language and documentation. In addition, a three-day product training course will be offered at $1,500 and knowledge engineering support will be available at $1,000 per day. Two development and support packages that combine different levels of training, knowledge engineering support, and hardware will also be offered. The development and support packages were constructed to meet the needs of a wide-range of developers with varying degrees of sophistication in advanced programming and AI techniques.

For the developer wishing to distribute multiple copies of a commercial application, a set of run-time utilities is available with the completion of a licensing and royalty agreement. The Personal Consultant run-time license option is priced at $25,000 and includes the licensing fee, a run-time software utilities diskette and documentation. There is an additional royalty fee of $25 per copy of each application produced.

The introduction of the TI Personal Consultant is a significant step towards bringing artificial intelligence (AI) technology into every day life. With this powerful new software package, expert systems can be developed for use in many fields—from banking and accounting to medicine and agriculture. Once these applications have been developed, the end-user will have access to a sophisticated tool previously reserved almost exclusively for those with large mainframe computers or expensive special-purpose computers.

Expert Systems: Computerized Consultants

An expert system is a complex program that can be designed to simulate the decision-making processes of a human expert in a particular field—in effect, a computerized consultant. It asks a series of questions, and applies "rules of thumb" gained from a human expert to analyze the answers and make recommendations. Most expert systems can even explain how they arrived at a particular conclusion by tracing back through their line of reasoning. Unlike conventional computer programs, expert systems can use qualitative as well as quantitative data, and can draw conclusions from incomplete or uncertain data.

The first expert systems were built in the late 1960s to play chess, checkers, and other games. Not until the 1970s, however, did expert systems become practical tools. One of the earliest expert systems, MYCIN, was developed by researchers at Stanford University to aid doctors in diagnosing bacterial infections. Tests showed that the diagnoses produced by MYCIN were as accurate as those of specialists in the field, and more accurate than those of non-specialists. Other expert systems have been developed for a variety of purposes. But most had one thing in common: they required large, expensive mainframe computers.

Personal Consultant: Bringing Expert Systems to Desktop Computers

Personal Consultant, on the other hand, was designed for use on today's desktop computers, such as the Texas Instruments desktop and portable Professional Computers. This makes the power and sophistication of expert systems available to users without having to access larger computers. What's more, the expert system can now co-exist with hundreds of conventional business software packages available under MS™-DOS, thereby increasing the effectiveness of people who already have personal computers by providing extra problem-solving support.

At the same time, Personal Consultant provides many of the features contained in larger, more expensive expert development systems. It is capable of developing an expert system of approximately 400 rules on a TI Professional Computer. When development is done on a larger machine, Personal Consultant can deliver an even larger expert system.

Personal Consultant guides programmers through the construction process with a rule specification language similar to BASIC, an interactive editor, a knowledge base lister, and debugging aids. Although Personal Consultant is written in Lisp, the primary programming language for artificial intelligence, no knowledge of Lisp is required unless user-defined functions are specified.

The Knowledge Base

The Personal Consultant expert system development tools include two major components: a development engine and an inference engine .

The development engine is used to create a knowledge base in a particular area of knowledge. The knowledge base includes facts selected by the designer. These facts include data found in textbooks, professional journals, and "heuristic" knowledge. Heuristic knowledge can be defined as good, sound judgement gained through many years of experience in a field.

The knowledge base generally is created by two people: a domain expert and a knowledge engineer. A domain expert is a specialist in the field for which the system is being designed. A knowledge engineer is a special kind of computer programmer, skilled in extracting information from the domain expert and converting that into usable computer code. The knowledge engineer designs the structure of the knowledge base and works with the domain expert to refine and debug the final expert system.

Once the knowledge base is complete, the development portion of the Personal Consultant system can be removed, allowing the resulting software system to reside on delivery machines with smaller memories. In many cases, only floppy disk storage is required to deliver expert system applications.

The Inference Subsystem

The inference subsystem (or inference engine) delivers the application by applying the rules and other information stored in the knowledge base to arrive at conclusions and make recommendations.

The Personal Consultant system represents knowledge as production rules. Each rule describes an inference (in other words, an IF "A" THEN "B" statement) that can be made about a specific situation. The premise, or IF part of the rule, describes the conditions that must be met for the rule to apply. The action, or THEN part of the rule, describes the conclusions that can be made when the premise is valid. For example, in an automobile

Continued on page 160

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Entries must be postmarked by Jan. 31, 1985. Entries may be used in future promotions. Winning entries must submit a disk with the picture file on it. An independent computer expert will be the judge. Winners will be announced on Feb. 28, 1985.

For further information, contact QUALITY 99 SOFTWARE, 1884 Columbia Rd. #500, Washington DC 20009.

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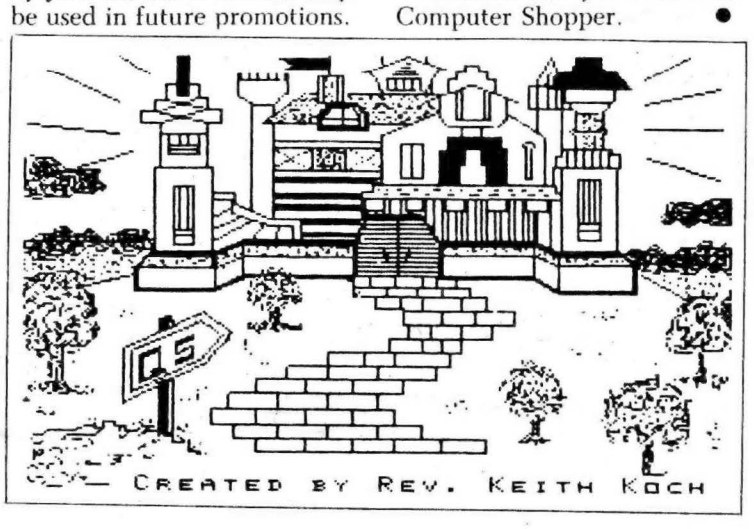

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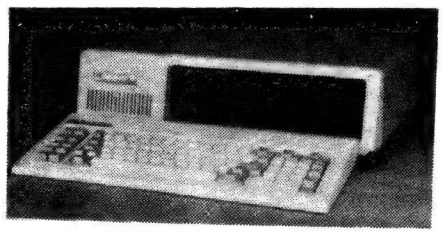

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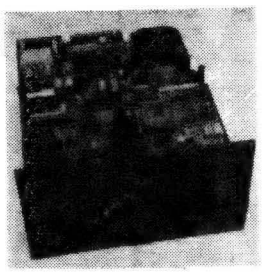

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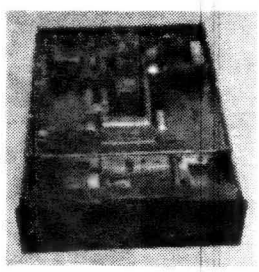

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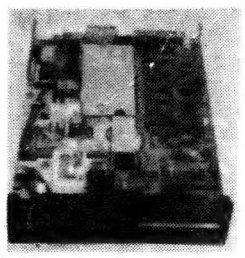

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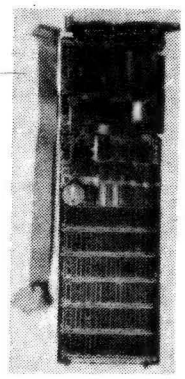

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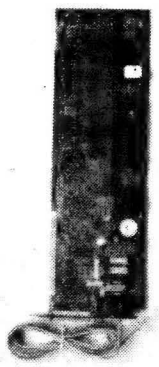

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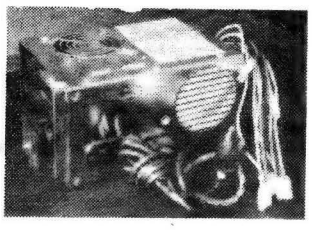

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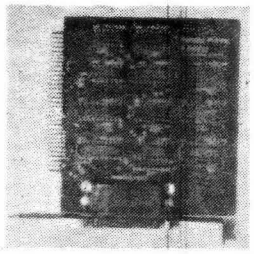

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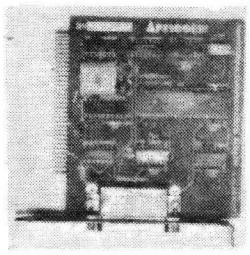

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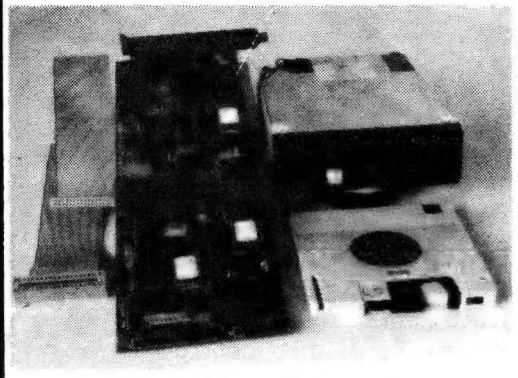

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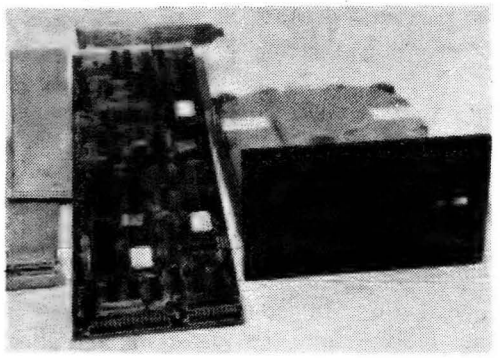

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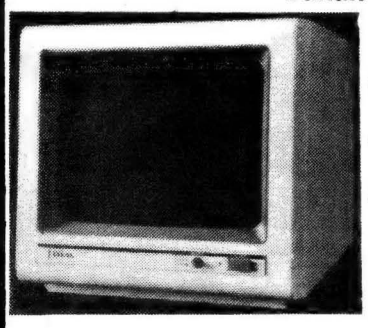

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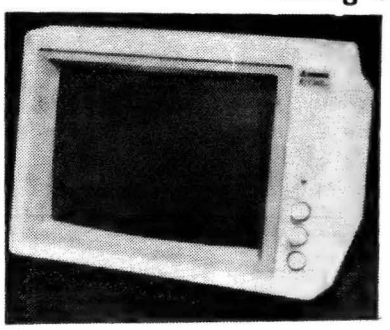

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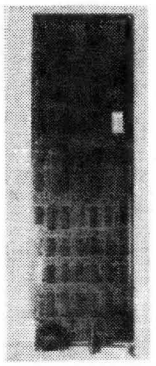

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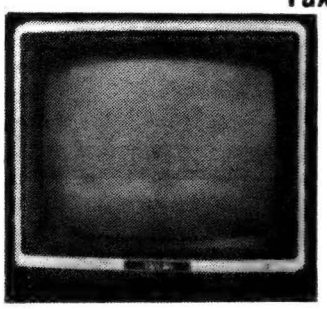

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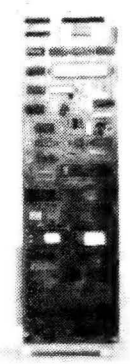

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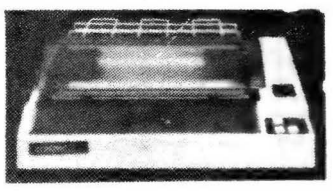

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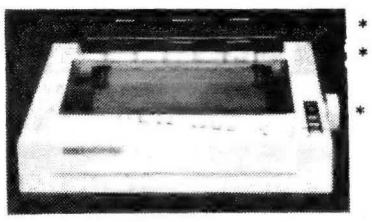

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TI's Personal Consultant Continued from page 156

diagnosis system, a production rule might be:

> PREMISE: IF having trouble starting engine, starter can crank engine, and engine is receiving gasoline: ACTION: THEN check for ignition problem.

Personal Consultant uses a similar rule structure as EMYCIN a generalized expert system development tool developed at Stanford University following the MYCIN project. Most knowledge bases created with EMYCIN can easily be modified to run with the Personal Consultant.

Another portion of the system maintains the "dynamic" facts about a particular consultation. These facts change from one consultation to another. Again using an automotive system as an example, the facts might include the make and model of the car, engine type, condition of the starter, and so on.

Personal Consultant can use uncertain information in analyzing a situation and making recommendations. By assigning certainty factors to specific pieces of information (e.g., "I am 50 percent certain this is correct"), end-users can include information that could not be added to other types of computer programs. When using uncertain data, Personal Consultant applies certainty factors to its recommendations.

Easy-to-use, Window-oriented Interface

To make all these advance features easier to learn and use, Personal Consultant uses a window-oriented user interface system.

Using the cursor to point-and-select, a prompting technique makes it easier to learn the system. This technique lets the user select from a list of alternatives on the screen instead of memorizing a long list of commands. Selections from lists can also be made by typing only the first letter instead of an entire word or phrase. The system includes a help facility that can answer user questions.

Personal Consultant applications normally operate in a question-and-answer format. It guides the user through a consultation by asking appropriate questions. The user can obtain more information on why a particular question was asked by simply asking "Why?" By asking "How?", the user can obtain the computer's entire line of reasoning. The user can then have a basis for accepting or rejecting the system's conclusion.

Increased Functionality The Goal of TI Research

Personal Consultant is a major milestone in making artificial intelligence more practical and affordable for everyday business applications. Texas Instruments has been working in the area of artificial intelligence since 1978 and continues to research such areas as knowledge representation techniques, knowledge engineering tools, computer hardware functionality, natural language and speed technology. TI is committed to applying AI techniques to making the man/computer interface a more natural and increasingly useful one. The Personal Consultant development tools will pave the way for a new wave of sophisticated application software that can expand and improve the ways in which desktop computers can be used as problem-solving tools. ●

TI Signals Take To The Air!

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"The user-oriented technology in PC/FOCUS reflects TI's own commitment to helping TI Professional Computer users immediately become productive in their application environment," said TI's manager of personal systems software. "Texas Instruments is a leader in developing practical applications of artificial intelligence, and PC/FOCUS complements TI's own proven offers of products based on artificial intelligence."

PC/FOCUS is available for $1595 through TI distribution and from IBI. PC/FOCUS requires 512K bytes of random access memory (RAM) and a Winchester disk.

For further information contact Texas Instruments Inc., Data Systems Group, P.O. Box 809063, Dallas, TX 75380-9063, 1-800-527-3500.

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TIMEX-SINCLAIR

Timex Sinclair Survival Column

by Mark L. Fendrick

As Sinclair owners, we start 1985 in quite a different position than we were in at the beginning of 1984. At that time, Timex had just made the T/S 2068 available, and was promising to support it to the hilt. We were all looking forward to Timex's modem, 80 column printer, solid state software, and, most of all, microdrives.

Now, one year later, Timex is out of the picture except for the name which adorns our computers. However, the picture is not as bleak as many would have you believe. While it is true that Timex is no longer producing anything for the computer, the third party developers have come on strong and even now, ten months after Timex's withdrawal, new compatibles are being introduced.

Two such software packages, originally contracted for by Timex, have been licensed and released for the T/S 2068. Both programs were developed by Micro-Systems, Inc., and are versions of programs also available for the TRS-80 and IBM PC. Timex, having developed a sophisticated computer, wanted software that could utilize the true capacity of the unit, and contracted with Micro-Systems to adapt two of their programs to run on the T/S 2068. The original plan was for the software to be released as Command Cartridges. Let's look at them one at a time.

The first is a word processing program called MSCRIPT. This program utilizes the 64 column capability of the T/S 2068. Written entirely in machine code, MSCRIPT is very fast, and includes the features that are most desired in a word processing package. Designed to work with the AERCO Centronics interface, MSCRIPT prints to a full size printer rather than the T/S 2040 printer. It comes in a vinyl case containing three tapes—a program tape and two others. Also included in the case is a 70 page user's manual.

The program LOADs in two parts: a title page and then the main portion of the program. Once LOADed, you see the main text entry/edit screen. This screen is black with a flashing "C" cursor in the upper left hand corner, and a line of information along the bottom. When the program first starts, this screen is set to a 64 column window, with 22 lines from top to bottom. Line 23 shows you the current TAB settings. The 24th line displays the current cursor position within the window, the actual column the cursor is in (the line length is not limited to the 64 columns displayed on screen), and the actual line within the document. This line also reminds you how to access the HELP menu.

Most of your composing and editing will take place on the main screen, with the majority of the editing functions available without switching screens. MSCRIPT features a full screen editor which allows you to move the cursor (via the T/S 2068's four arrow keys-CAPS SHIFT 5, 6, 7, & 8) to the position of the desired changes, and just overtype the existing text. Often, this is the extent of the required changes. If, however, you must insert more text than you have room for, you must open up an insert block into which you can type (on screen) as much as is necessary. To do this, you must press FUNCTION-I. Since the T/S 2068 does not have a FUNCTION key, it is replaced by depressing both the CAPS SHIFT and the SYMBOL SHIFT keys at the same time, and then the letter key indicated. The majority of the editing functions may be accessed in this manner. Pressing FUNCTION-H will show you the list of FUNCTIONS that are available to you.

Writing with MSCRIPT is quite easy. To get started all you do is type. Words that don't fit on a line are automatically moved to the next line—so rapidly that you do not have to pay any attention to make sure that the program is keeping up with you. Although I am not a speed demon when it comes to typing, I have lost characters while using other word processing software. This has never occurred using MSCRIPT. In fact, one of the few complaints I do have with this software is the fact that the auto-repeat on the space bar is so sensitive that I often have to delete extra unwanted spaces. When you reach the end of a paragraph, or other block of text, pressing the ENTER key takes you to the next line, leaving a backslash (\) to indicate a carriage return.

The more sophisticated editing features are accessed directly from the text entry/edit screen using the FUNCTION simulation. FUNCTION-B allows you to mark the beginning and/or the end of a block of text. This block can be reproduced and/or inserted at any point in the text, or deleted with a single keystroke. FUNCTION-U causes marked blocks to be unmarked. FUNCTION-T moves the cursor to the first line of the document, while FUNCTION-E moves the cursor to the last line of the document. FUNCTION-I opens an insert block for your additional text, and FUNCTION-M merges two blocks of text. The FUNCTION-I / FUNCTION-M combination is probably the most used set of editing features. When an insert block is opened, and text is added, the merge function brings the text back together again.

Another powerful feature of MSCRIPT is the ability to imbed printer codes within the text of the document. Printer codes are the codes that a computer transmits to the printer causing it to change the style of print (italics, double width, etc.), or perform certain tasks (see your printer's manual for its unique abilities). Since each printer has its own set of codes, MSCRIPT allows you to define them, and use the codes for your specific printer. This is accomplished using the FUNCTION-G combination. MSCRIPT comes with two printer instructions built in. These cause the text to double strike, or be underlined. You may want to compare this method of underlining with the underlining you get by imbedding codes, as the MSCRIPT underline is a series of unconnected underlines, while your printer might be capable of an uninterrupted style.

Other FUNCTION codes are explained in the manual, but one important one, that only applies to T/S 2068, is FUNCTION-8. Although the manual is well-written, and very easy to understand, it was not specifically written for the T/S computer. The first page of the manual explains the Timex adaptations of the FUNCTION key and COMMAND key, but one application seems to have slipped past. That is the ability to utilize the TAB functions. Even though the full use of TABs are well explained, including the setting of the TABs, the TAB keyword on the Timex is inaccessable, and the replacement function is not mentioned. In a recent telephone conversation with Micro-Systems, the mystery was solved. The CAPS SHIFT / SYMBOL SHIFT combination used with the right cursor arrow (found on the "8" key) accomplishes the TAB. This is the only fault I found with the manual, which is an excellent document for both the experienced word processor, as well as the complete word processing novice.

You may also set or change many printing parameters directly from the text entry/edit screen. You may change the line length, left margin, justification, centering, and much more by simply making the proper entries on the screen. You can insert headers, footers, and page numbering as well. Changing the format is so quick and easy that you will not hesitate to format your document for fear of complicated procedures.

A few editing procedures do occur from a screen designated the MSCRIPT Command Menu. From here, you have a number of abilities available to you. The command Menu is the place from which you LOAD and SAVE your documents. If you often send

Continued on page 162

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Fendrick
Continued from page 161

form letters that are created by putting together a number of stock paragraphs (boilerplate), you can load them one after another by using the APPEND DOCUMENT command. Suppose you find that you have misspelled a word throughout your document, and you want to correct it at each occurrence. You would use the FIND STRING command, followed by the CHANGE STRING command. This replaces all occurrences of the old string with the new string (global search and replace). The manual gives you some interesting uses for this feature. You can set the TAB positions from the Command Menu, or change the width of the window on which you can make your entries. This does not affect the width of your printout, but makes it easier to visualize your final document. You can set your window to a length of up to 230 columns, and when the cursor reaches the edge of the window, the text scrolls automatically. I have found, however, that in order to actually see how your final document will appear, you have to set the window to one column more than the number of columns on the printed page. The Command Menu also allows you to restart the program entirely.

This screen also gives you some information about the current status of your document: Memory used (this column used 16770); Memory free (starts at 18439); Window size: Word count; Line count; Current document (name). The status of the TABs set is shown on the bottom, as it is on the text entry/edit screen. You access this menu by pressing CAPS SHIFT and BREAK. A word of advice here—depress the CAPS SHIFT key before the BREAK so you avoid causing a space on the text entry/edit screen which would occur by pressing the BREAK key alone.

The final screen is the MSCRIPT Print Menu. The current print values are shown, and may be changed from this menu. (Remember that they may also be changed from within the text of the document.) The parameters you may set from here are justification (yes/no); page length; left margin; line spacing; single sheet (yes/no); page spacing; line length; and page number. Pressing ENTER causes the document to be sent to the printer. MSCRIPT comes with the AERCO print driver built in.

The complaints I have about MSCRIPT are few, and minor. The excellent manual compliments this program well. Of the many word processing packages available for the T/S 2068, this has to rate at the top of the list. (I have heard good things about Tasword II, but since I have never seen a copy, I cannot comment here.) MSCRIPT is available from 21st Century Electronics (6813 Polk Street; Guttenberg, NJ 07093; (201) 869-2616.

The second program by Micro-Systems was one of the most eagerly awaited for the T/S 2068. When Timex went out of the computer market, the modem became available through Westridge Communications. It came with what became known as SMART TERMINAL I software. This was the basic software needed to communicate with other computers. Lacking in this package was the ability to store telephone numbers, or upload (send the contents of a buffer to another computer) and download (store what another computer is sending to you in a buffer). Timex had planned to release a Command Cartridge with these capabilities—SMART TERMINAL II. Today, Anchor Automation holds the license to market the modem and both of these programs. When the modem was made available, it came with the SMART I software, and most people anx-

Continued on page 164

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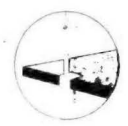

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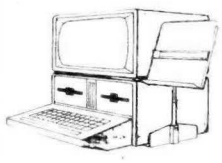

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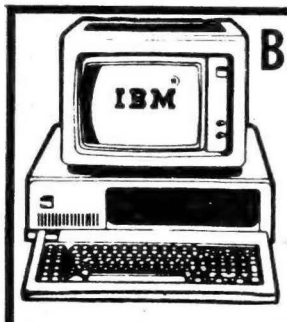

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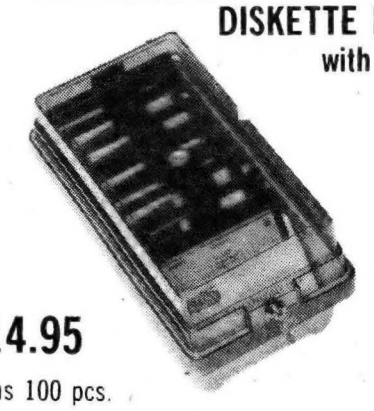

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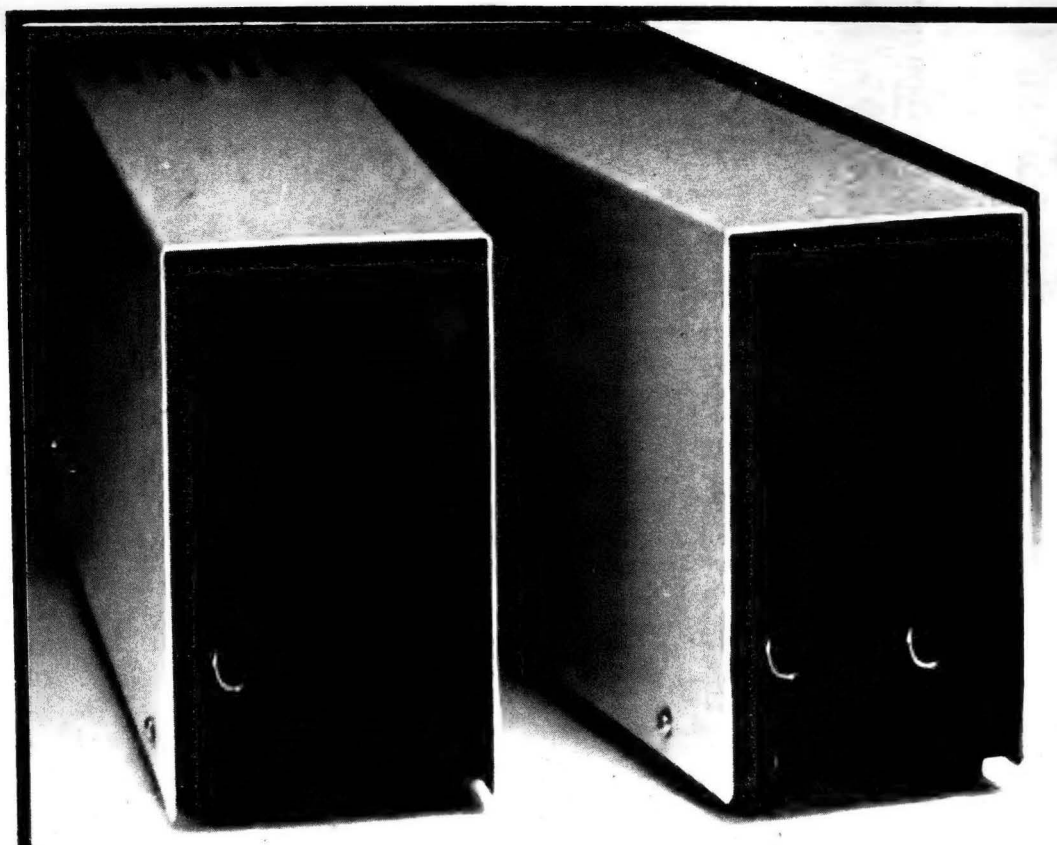

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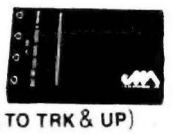

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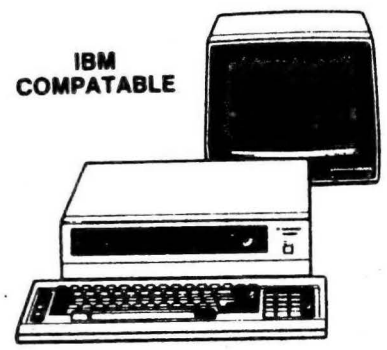

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CONTROL DATA

Fendrick
Continued from page 162

iously awaited the arrival of SMART II. After months of delay (we were told that the manual was being written), it was finally released. Unlike the SMART I program which had an easy to understand manual, SMART II had a manual which did not explain any of the new features. With SMART II, you now could upload and download text and programs, but the only reference to utilizing this ability was in one line which says: "The buffer controls listed above are self-explanatory." The entire use of the conversion routine is summed up on the same page in the following manner; "There is also a HEX, REM, NONE conversion routine." I certainly could not determine the use of these features from those instructions, and by the mail and online messages I was receiving, I was not alone. The manual stated that if there were any questions on the use of the software, to contact Micro-Systems, and a telephone number (incorrect) was given. A telephone call to Micro-Systems produced the following results.

Micro-Systems is NOT supporting SMART II. It seems that when they were originally contracted by Timex to write the software, they had a good deal in which they received a per sale royalty. When Timex gave up, they licensed the software to Anchor for a one time license fee, with no royalty agreement. Anchor, however, did not purchase support, and as such, Micro-Systems will not train their technical staff in the use of the T/S 2068. Only Mark Lautenschlager (general manager) and Steve Pagliarulo (author of SMART I & II, as well as MSCRIPT) are familiar with the T/S 2068. However, Micro-Systems is not to be looked at as the villain in this, as they have indeed done much to alleviate our problems. An offer was made to Anchor to have two of their technical staff fly to Micro-Systems to be trained in the use of the software. In addition, Jim Warren of Anchor has been designated to act as liaison between the two companies, and he can call Micro-Systems with any problems, and have his questions answered. If you have a question about the program, you should call Jim Warren, since the responsibility of support rests with Anchor.

Yet, Micro-Systems is offering a good deal of support even though their official line is (rightfully) that it is not their responsibility. Micro-Systems operates a BBS on which exists a Timex sub-board (Section 2). You may access this board and ask questions about the operation of the program. Your questions will be answered by Steve Pagliarulo. There are also a number of T/S 2068 programs which you may download. The telephone

Continued on page 165

Emulex Announces SCSI-Based Tape Controller For Micro-Subsystems

Emulex Corporation has introduced a new version of its Titleist SCSI tape controller series, designated the Model MT0 2. The MT0 2 supports the new-generation QIC-36 standard, ¼-inch streaming cartridge tape drives. Employed with an independent host adapter from Emulex, the MT0 2 interfaces through the versatile Small Computer Systems Interface (SCSI) to a variety of computers and subsystem, including the IBM PC and compatibles, the IEEE 796 Multibus, and the DEC QBus and Unibus. The MT0 2 can also be used with any other type of system when the proper host adapter is made available.

The MT0 2 tape controller is designed for use with the QIC-36 ¼-inch streaming cartridge tape drives using the QIC-24 media format. This format provides 9-track sequential, serpentine recording, at a density of 8000 bpi (GCR) and a speed of 90 ips.

LThe Titleist MT0 2 supports full SCSI arbitration for up to eight host or peripheral devices, including disconnect/reconnect capability. This allows devices performing time-consuming tasks such as seeks and rewinds to release the bus temporarily and reconnect when the command has been completed. This is an important feature where there are multiple hosts and devices attached to the bus, since other devices can utilize the bus while these tasks are being performed.

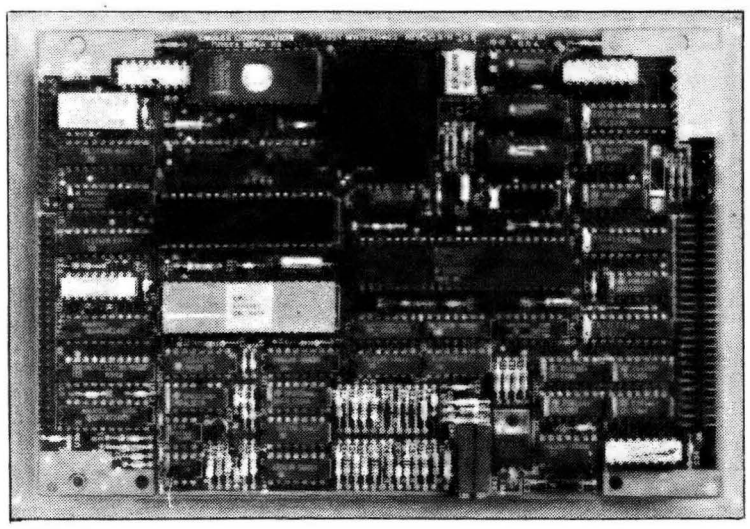
Performance is enhanced by a 14 KB data buffer that provides for efficient streaming operation, preventing data lates and permitting operation at a low bus priority level, while handling the full data transfer rate of the QIC-36 tape drives.

In the QIC-36 media format, a read-after-write verification is automatically performed when data is recorded on the tape. As each block is written, it is immediately re-read and if an error is detected, the block is rewritten at another point on the tape, using the same block number.

developed by Emulex, which implement the buffer control and tape formatter sections of the controller.

Internal self-test diagnostics are performed by the microprocessor as part of start-up operation. Edge-mounted LEDs are incorporated on the board for fault/activity display. Board power requirement is +5 VDC at a nominal 1.5 amps, from the internal CPU power supply.

List price for the Titleist



The MT0 2 tape controller is a single, printed circuit board measuring 5¾ x 8-inches which resides within the chassis of the QIC-36 tape transport. It employs high-speed MOS microprocessor technology centered around a custom set of VLSI chips

MT0 2 is $435. Standard delivery is sixty days after receipt of order.

For further information, write to Emulex Corporation, 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626.

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For further information contact Computing Capabilities, 465-A Fairchild Dr., Suite 122, Mountain View, CA 94043. (415) 968-7511.

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Fendrick
Continued from page 164

number is (305) 832-2503. In addition, on CompuServe, you may GO PCS-52. This is a telecommunications SIG run by Micro-Systems. An attempt will be made to answer your inquiries here too.

At the present, the word is that Anchor is in the process of rewriting the manual, so you might want to check with them about obtaining the revised copy.

Getting down to the nitty-gritty of the program, here is a brief description of the three CON modes, and a guide to uploading.

CON NONE: This is the setting you would use to download any text that is being transmitted. In this mode, you may enter the terminal mode before you go online, and with the buffer open, you may type anything you wish to upload once you go online. You would use this mode when uploading such text.

CON REM: By exiting to BASIC from the main menu, you may create data to be transmitted in the form of REM statements. When transmitting in this mode, the line number and REM token will be ignored, and only the contents will be transmitted.

CON HEX: Due to the fact that the Timex uses a single code token for its keywords, if you want to upload any programs to a non-Timex computer (as is the case with BBS's) you will need to translate the ASCII codes into their HEX equivalents. When you attempt to download the program, use this mode, and the program will automatically reconvert to the ASCII codes, and the program will appear properly in the buffer.

To actually transmit what is in your buffer, press CAPS SHIFT-8 and then M to return to the main menu. Select option D to go to the buffer menu, and then T to transmit. You will be asked for a prompt string, and in most cases may simply press ENTER, meaning no prompt will be expected. If

Continued on page 166

Navarone Introduces Three Slot Expander For Commodore 64 Computers

Navarone Industries, the company that makes the Cartridge Expander for the TI-99/4A computer, announced it will now provide the same Three slot expander unit for use on the Commodore 64 computers also.

The Cartridge Expander solves a lot of the problems people have with plugging cartridges into the back of the computer. The Expander plugs in just like a cartridge, then up to three cartridges can be plugged into the Expander and selected by a switch. Another feature is the built in reset switch that allows the computer to be reset without having to turn the power off and on. Unlike so many products of it's kind, Navarone has provided a nice plastic shell for their Cartridge Expander.

The new Cartridge Expanders should be available at most mail order houses and large department stores in time for Christmas at a suggested retail price of $39.95.

You can get more information on these and other Navarone products by writing to Navarone Industries, Inc., 510 Lawrence Expressway #800, Sunnyvale, CA 94086.

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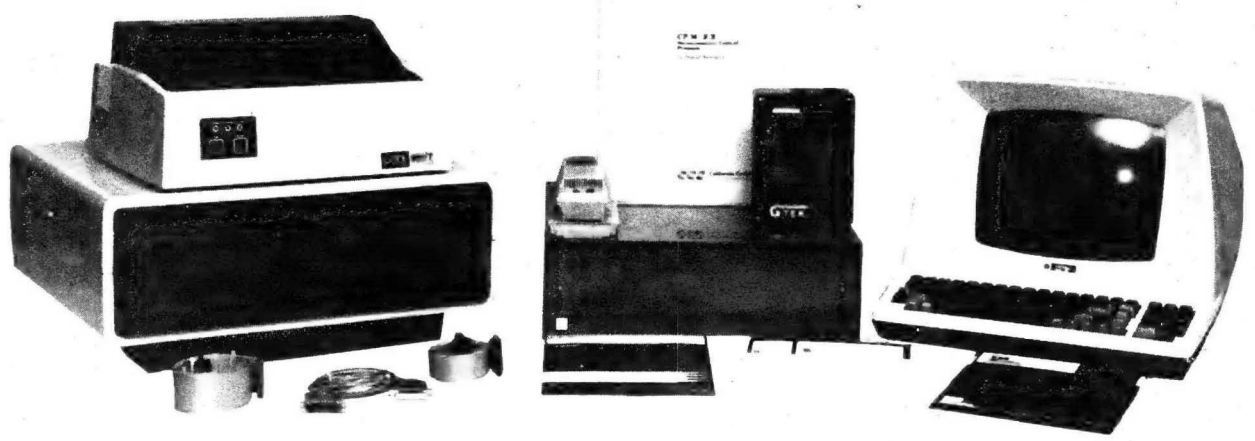

The computer available for STD or S100 BUS features 64K of ram (128K optional), 4 Mhz Z80, DMA floppy disk controller and extra card slots are provided in the card rack for future system expansion. Two DSDD disk drives provide 2.2 Megabytes of storage. Included with the system is a 80 cps printer using the standard centronics type interface. This printer features bidirectional printing, 9 X 7 dot matrix, upper/lower case character set, block mode graphics and a suppress mode which prints up to 132 characters per line. The televideo 910 terminal which operates at 19.2K baud also supports upper/lower case characters. Commonly used eproms from 2708's up to 27256's are supported with the prom programmer (8748 and 8751 families can also be supported). Up to eight eporms can be erased at a time with the uv eraser provided. All interface cables for the system are supplied. A custom version of CPM 2.2, Wordstar and an assembler is included (optional cross assemblers are available). In circuit emulators for 6502, Z80, 8080, 8085, 8048/49 and others are optional. A 300/1200 baud modem can also be purchased optionally. Extra I/O, special function cards and hard disk mass storage available.

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Fendrick
Continued from page 165

you are calling a system that uses prompts, and wish to utilize this feature, you then enter the proper character. You may find, however, that you will have to transmit the initial prompt as you may have missed the host system's transmission when you are out of terminal mode. Finally you will be asked for a delay speed. You may have to experiment a bit since sending too fast may cause problems including taking you offline. When you have responded to these questions, press ENTER twice to return to terminal mode, and the data will then be transmitted.

There you have it, the story of two programs by the same author; one well documented and looking like the excellent program that it is. The other very poorly documented causing problems for whoever buys it. (Mterm-the true name of SMART II- for the T/S 2068 is more powerful, with a larger buffer than its counterpart for the IBM-PC.) This is a very dramatic demonstration of the importance of proper documentation. ●

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Controversial "Brainwashing" And Self-Hypnosis Software Released

New Life Institute has released software for the IBM PC and compatibles, designed to reprogram the user's habits, behaviors, and personal beliefs, while he works at any computer task. Titled Subliminal Suggestions And Self-Hypnosis Programs For Your Computer!, the program constantly flashes user-chosen messages as a super-high speed hidden "subliminal" (subconscious) background on the screen, while the operator works on other computer tasks. The subliminal messages which "reprogram" the user's subconscious, can be used to effortlessly address a wide range of problems, desires, attitudes, and beliefs, ranging from health habits such as smoking and weight loss to sexual hangups and irrational fears.

The package also contains "very effective" programs for Self-Hypnosis and Deep Relaxation, using an optical illusion eye fixation method.

"The power, effectiveness, and implications of our subliminal software are mind-boggling," says New Life Institute director Joel Amkraut. "The two keys to change and persuasion are repetition, and reprogramming the subconscious mind. Advertisers and hypnotists have known this for ages. We've harnessed computer power to constantly, effortlessly, repeat desired suggestions. In eight hours the computer user receives 28,800 suggestions—flashed at a subconscious level—beamed **straight into the subconscious mind**—while he or she does any personal or business computer work. The result is 'effortless' self-improvement. For example, a user who wants to stop smoking would simply enter the suggestion in the morning and be subconsciously 'brainwashed' during the work day."

The software is accompanied by a 101-page manual, **Subliminal Suggestion And Self-Hypnosis Programs For Your Computer!: A Modern Tool For Self-Improvement.** Specially written to accompany the software, the book explains subliminal reprogramming; hypnosis; self-hypnosis; creating effective suggestions; and especially, how to achieve fast, easy change and self-improvement in all aspects of health habits, personal beliefs, and personal effectivenss.

Besides the subliminal program, the package includes separate programs for self-hypnosis and for deep relaxation. According to Amkraut, "they both use an extremely effective pulsating optical illusion to 'pull' the viewer into hypnosis or deep relaxation. Even experienced hypnotists, such as those who helped develop the programs, would 'go under' by watching the screen." Both the hypnosis and deep relaxation programs can incorporate helpful suggestions.

"Hypnotism and subliminal suggestions," according to Amkraut, "are being used for a growing variety of mental and physical problems, since the mind is so intimately involved in all aspects of health. A growing body of evidence suggests that emotions and self-concept play a major role in virtually **all** illnesses. The fact that a burn can be caused through suggestion alone proves the power of the mind to cause physical change, for better or worse. And once suggestions are planted in the subconscious, they work steadily not only during waking and work hours but 24 hours a day."

Subliminal suggestions and self-hypnosis have been used for: smoking; weight loss, weight gain; insomnia; alcohol and drug problems; memory improvement; stuttering; fears, phobias and countless other mental and physical problems and desires.

One chapter of the book, "Subliminal Suggestions In The Automated Office," raises the spectre of a dark side of subliminal communication: the use against unaware targets. An employer could use a terminal system to instill employee loyalty and fanaticism; prevent theft; or even to send seductive suggestions to an unknowing typist, to further sexual ambitions. The book concludes that the technology is available and it would be almost impossible to stop such uses.

Amkraut warned that, "Hardware and software manufacturers might also use hidden messages. Software houses could insert product loyalty messages in programs, while hardware firms could put messages into ROMs (programmable read-only memory) in the computer or terminal for similar purposes. Several advertising agencies were even more excited over the possibilities than some of the hypnotists and helping professionals we consulted!"

"Subliminal technology is frightening because of the enormous effectiveness and potential for misuse," said Amkraut. "But our program is designed to give the user control over the suggestions—to allow effortless reprogramming for personal improvement. If you believed someone had slipped in a suggestion while you were at lunch, for example, you could simply stop or change the message. Other, undocumented software or hardware techniques (such as those built into a terminal) could not be stopped."

While his program brings up thoughts of George Orwell's "1984," and "Big Brother's" thought control activities, Amkraut repeatedly emphasized that his subliminal software was designed for positive purposes, to give the computer user the means to deal with problems and take charge of and improve his own life.

The following are comments from users of the program:

"The subliminal messages let me work on personal problems while I do my typing."

"The book chapter on possible future misuse of this kind of software is very frightening. . . . the scariest thing I've read since '1984.' Big Brother would be proud."

"Excellent manual. The book is very clear, gives effective guidance for self-improvement, with or without the 'mind-control software.'

"Electronic voodoo."

The programs are written in C language with several assembly language routines. They require only about 20K of memory and run on the IBM PC and compatibles. Commodore 64, Apple, and other versions are planned in the near future.

The package includes the Subliminal; Self-Hypnosis; and Deep Relaxation programs, and the accompanying manual. It retails for $75. The **Subliminal Suggestions & Self-Hypnosis** package, or information, is available from: NEW LIFE INSTITUTE, Software Division, P.O. Box 2390, Santa Cruz, CA 95063.

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CP/M

KAMAS Outline Processor And Programming Language

by Hardin Brothers

Recently, several computer magazines have carried articles heralding (or bemoaning) the death of CP/M. If KAMAS, from Compusophic Systems, is any indication of the creative work still being done by CP/M programmers, those reports are greatly exaggerated.

KAMAS (an acronym for "Knowledge and Mind Amplifications System") is the first, and only, outline processor that will run under CP/M. But it is also much more than that. It is an information retrieval system, a word processor, a telecommunications package including a BBS, and a complete programming language. If you take the time to learn all of its ins and outs, you can make KAMAS do almost any non-numeric computing you can imagine.

KAMAS has so much power and so many features that at first it seems somewhat overwhelming. The KAMAS documentation is supplied as two large spiral-bound books with a total of over 500 pages, and a 70-page pamphlet. A new KAMAS user is saved, however, from having to learn any more of the system than he or she wishes. The outermost level of KAMAS, and the one that most people will use, is an outline and word processor that is completely explained in the seventy-page pamphlet. When you start learning KAMAS, stick with the outline processor and pamphlet until you are ready to move on.

What do you get when you cross an information retrieval system, a word processor, a telecommunications package (with BBS) and an outline processor? You get a complete programming language called KAMAS! Hardin Brothers reviews this new system which runs under CP/M-80 and he says that its power is somewhat overwhelming!

The basic idea of outline processors (and there are several now available for MS-DOS computers) is that most of us work best from the top down. If we organize our ideas in a simple outline before starting to write them down, the final text will be much easier to understand and will be created much more easily and quickly.

You start a session with KAMAS by defining a topic, which creates a disk file of the same name, and allocating between 8K and 8M bytes of disk space for it. If you think of the topic as a trunk of a tree, everything else in the file is connected to it through branches, branches of branches, twigs and leaves.

After you have defined a topic, you can begin to add branches to it with the outline editor. KAMAS's outlines look like those you struggled through in school, except that there are no numbers or letters identifying the parts of the outline. Instead, KAMAS uses a series of indentations to indicate the relationships between various branches. Each line of the outline, regardless of how far it is indented, must contain a key of up to 31 characters plus an optional subtitle.

As you define a new outline, you can move left or right, adding branches or branches of branches, as you wish. The length of the outline depends on how much disk space you have allocated to the file—if you allocate 200K bytes of disk space to a file, you can have up to 1500 items in the outline.

Of course, 1500 items are not going to fit on your screen at one time. The KAMAS outline editor lets you move from screen to screen as well as from branch to branch at any time. Also, at any time, you may define a "leaf" for the branch at the current cursor position. A leaf is up to 2420 bytes of text (written with KAMAS's text editor) that is associated with any outline item. You can easily move between the outline editor, which establishes the branches and their titles, and the leaf editor with just a few keystrokes.

One of the nice features of the KAMAS outline editor is that most of the commands for moving around the outline have two different forms. One is a CTRL-key command similar to a Wordstar command; the other is a cursor key or single-letter command similar to an EMACS editor. Since most word processors seem to follow either the Wordstar or EMACS system of commands, you should find that you can move quite easily around the outline in almost the same way you'd move through a document in your word processor.

However, once you move from the KAMAS outline editor to its leaf editor (and it's a move you'll make often as you create an outline and its associated text), you find yourself faced with an entirely new set of commands, using both

Continued on page 172

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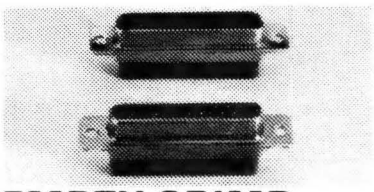
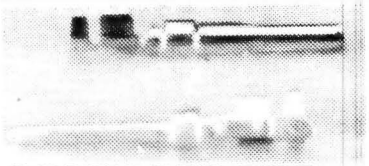
D-SERIES CONNECTORS



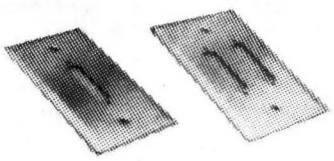
EMPTY CRIMP SHELLS

PART #	PRICE/QTY 1-49	50-99	100-UP
C9P	0.86	0.78	0.72
C9S	0.90	0.82	0.75
C15P	0.88	0.80	0.73
C15S	0.92	0.84	0.77
C25P	0.90	0.82	0.75
C25S	0.94	0.85	0.78
C37P	1.04	0.95	0.87
C37S	1.06	0.96	0.88
C50P	1.14	1.04	0.95
C50S	1.20	1.09	1.00



CONTACTS FOR EMPTY CRIMP SHELLS

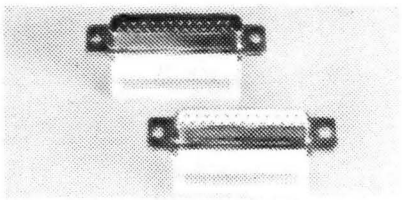
PART #	PRICE/QTY 1-99	100-999	1000-UP
CP20P	0.08	0.07	0.06
CP20S	0.10	0.09	0.08



RS—232 DB—25 WALL PLATES

metal wall plates

PART #	PRICE/QTY 1-24	25-49	50 UP
WP-1	2.95	2.66	2.36
WP-2	3.45	3.11	2.76

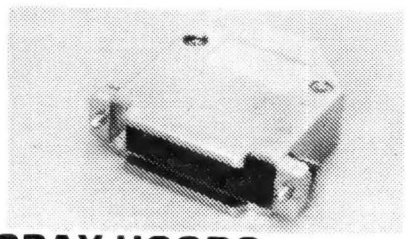


RIBBON CABLE CRIMP ON D CONNECTORS

PART #	PRICE/QTY 1-49	50-99	100-UP
IDC-9P	4.00	3.64	3.33
IDC-9S	4.28	3.89	3.57
IDC-15P	4.86	4.42	4.05
IDC-15S	5.24	4.76	4.37
IDC-25P	5.24	4.76	4.37
IDC-25S	5.82	5.29	4.85
IDC-37P	8.22	7.47	6.85
IDC-37S	8.92	8.11	7.43
IDC-50P	19.71	18.40	17.25
IDC-50S	23.87	20.46	19.09

P.C. MOUNT STRAIGHT

PART #	PRICE/QTY 1-49	50-99	100-UP
P9P	1.58	1.44	1.32
P9S	2.60	2.36	2.17
P15P	2.10	1.91	1.75
P15S	3.66	3.33	3.05
P25P	2.90	2.64	2.42
P25S	4.38	3.98	3.65
P37P	4.30	3.91	3.58
P37S	8.18	7.44	6.82
P50P	5.50	5.00	4.58
P50S	10.70	9.73	8.92



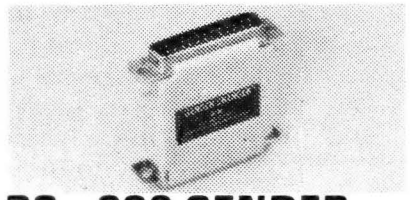
GRAY HOODS

PART #	PRICE/QTY 1-49	50-99	100-UP
GH-9	1.02	0.93	0.85
GH-15	1.04	0.95	0.87
GH-25	1.06	0.96	0.88
GH-37	1.18	1.07	0.98
GH-50	1.32	1.20	1.10

CONTACT EXTRACTOR TOOL

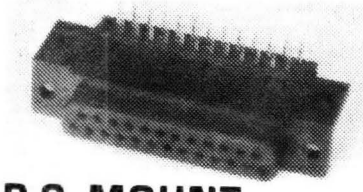
extracts contacts from D crimp shells

PART #	PRICE/QTY PRICE
EX-1	2.75 EACH



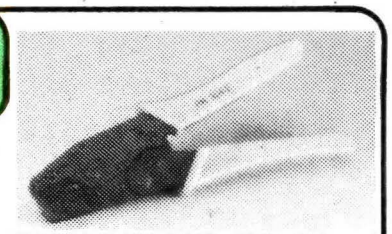
RS—232 GENDER CHANGERS

PART #	PRICE/QTY 1-9	10-UP
AGC-M	9.95	7.95
AGC-F	9.95	7.95



P.C. MOUNT RIGHT ANGLE

PART #	PRICE/QTY 1-49	50-99	100-UP
R9P	2.54	2.31	2.12
R9S	2.60	2.36	2.17
R15P	2.98	2.71	2.48
R15S	3.10	2.82	2.58
R25P	3.72	3.38	3.10
R25S	3.00	2.73	2.50
R37P	4.70	4.27	3.92
R37S	4.90	4.45	4.08
R50P	9.72	8.84	8.10
R50S	11.00	10.00	9.17



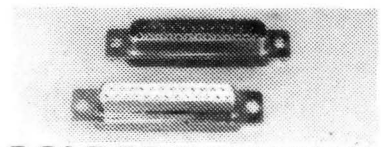
CRIMPING TOOL

for crimping D series contacts

PART #	PRICE/QTY PRICE
CT-1645	79.95 EACH

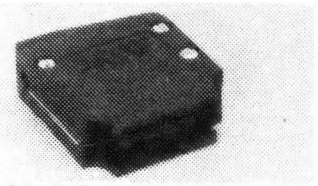
D-SERIES HARDWARE

PART #	PRICE/QTY 1-49	50-99	100-UP
MDH-1	0.55	0.45	0.35
FDH-1	0.85	0.75	0.65



SOLDER POT TYPE

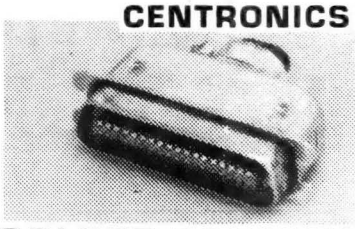
PART #	PRICE/QTY 1-49	50-99	100-UP
9P	1.44	1.31	1.20
9S	1.94	1.76	1.62
15P	1.96	1.78	1.63
15S	2.60	2.36	2.17
25P	2.20	2.00	1.83
25S	2.80	2.55	2.33
37P	4.00	3.64	3.33
37S	5.20	4.73	4.33
50P	5.08	4.62	4.23
50S	7.80	7.09	6.50



BLACK AMP HOODS

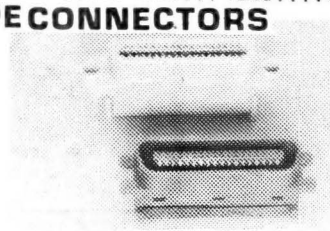
PART #	PRICE/QTY 1-49	50-99	100-UP
AH—25	1.30	1.18	1.08

CENTRONICS TYPE CONNECTORS



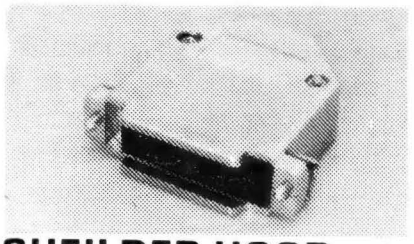
SOLDER POT TYPE

PART #	PRICE/QTY 1-49	50-99	100-UP
CEN-36P	4.00	3.64	3.33
CEN-36S	4.20	3.82	3.50
CEN-36SCM	3.50	3.18	2.92



RIBBON CABLE CRIMP ON

PART #	PRICE/QTY 1-49	50-99	100-UP
IDC-36P	6.00	5.45	5.00
IDC-36S	7.90	7.18	6.58



SHEILDED HOOD

PART #	PRICE/QTY 1-49	50-99	100-UP
SH-25	1.35	1.23	1.13

RIBBON CABLE CONNECTORS

IDH SHROUDED HEADERS

P.C. MOUNT RIGHT ANGLE

PART #	PRICE/QTY 1-49	50-99	100-UP
IDH-10R	0.80	0.72	0.64
IDH-20R	1.20	1.08	0.96
IDH-26R	1.50	1.35	1.20
IDH-34R	2.00	1.80	1.60
IDH-40R	2.40	2.16	1.92
IDH-50R	2.95	2.66	2.36
IDH-60R	3.86	3.47	3.09

P.C. MOUNT STRAIGHT

PART #	PRICE/QTY 1-49	50-99	100-UP
IDH-10	0.80	0.72	0.64
IDH-20	1.15	1.04	0.92
IDH-26	1.50	1.35	1.20
IDH-34	1.95	1.76	1.56
IDH-40	2.30	2.07	1.84
IDH-50	2.85	2.57	2.28
IDH-60	3.45	3.11	2.76

1 x .1 spacing, gold plated pins

IDH BREAKAWAY HEADER STRIPS

P.C. MOUNT STRAIGHT

PART #	PRICE/QTY 1-49	50-99	100-UP
IDH-10B	0.30	0.27	0.25
IDH-14B	0.42	0.38	0.35
IDH-16B	0.48	0.44	0.40
IDH-20B	0.60	0.55	0.50
IDH-26B	0.78	0.71	0.65
IDH-34B	1.02	0.93	0.85
IDH-40B	1.20	1.09	1.00
IDH-50B	1.50	1.36	1.25
IDH-60B	1.80	1.64	1.50
IDH-80B	2.40	2.18	2.00

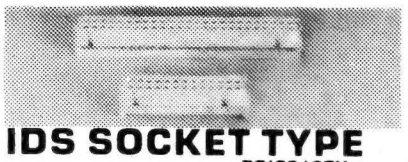
P.C. MOUNT RIGHT ANGLE

PART #	PRICE/QTY 1-49	50-99	100-UP
IDH-10BR	0.38	0.35	0.32
IDH-14BR	0.53	0.48	0.44
IDH-16BR	0.61	0.55	0.51
IDH-20BR	0.76	0.69	0.63
IDH-26BR	0.99	0.90	0.82
IDH-34BR	1.29	1.17	1.08
IDH-40BR	1.52	1.38	1.27
IDH-50BR	1.90	1.73	1.58
IDH-60BR	2.28	2.07	1.90
IDH-80BR	3.04	2.76	2.53

dual row .1 x .1 spacing, gold plated pins

ALTEX ELECTRONICS

RIBBON CABLE CRIMP ON CONNECTORS



IDS SOCKET TYPE

PART #	PRICE/QTY 1-49	50-99	100-UP
IDS-10	1.15	1.04	0.92
IDS-14	1.35	1.22	1.08
IDS-16	1.45	1.31	1.16
IDS-20	1.50	1.35	1.20
IDS-26	2.40	2.16	1.92
IDS-34	2.90	2.61	2.32
IDS-40	3.50	3.15	2.80
IDS-50	4.25	3.83	3.40
IDS-60	5.80	5.22	4.64

IDE EDGE CARD TYPE

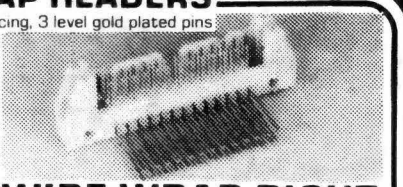
PART #	PRICE/QTY 1-49	50-99	100-UP
IDE-10	1.90	1.71	1.52
IDE-14	2.00	1.80	1.60
IDE-20	2.25	2.03	1.80
IDE-26	2.65	2.39	2.12
IDE-34	2.95	2.66	2.36
IDE-40	3.50	3.15	2.80
IDE-50	4.25	3.83	3.40

IDH WIRE WRAP HEADERS

.1 x .1 spacing, 3 level gold plated pins

WIRE WRAP STRAIGHT

PART #	PRICE/QTY 1-49	50-99	100-UP
IDH-10W	1.50	1.35	1.20
IDH-20W	2.55	2.30	2.04
IDH-26W	3.20	2.88	2.56
IDH-34W	3.75	3.38	3.00
IDH-40W	4.50	4.05	3.60
IDH-50W	5.50	4.95	4.40



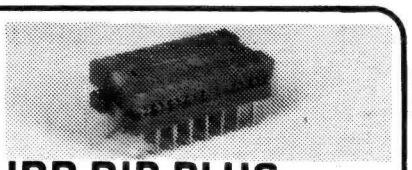
WIRE WRAP RIGHT ANGLE

PART #	PRICE/QTY 1-49	50-99	100-UP
IDH-10WR	2.45	2.21	1.96
IDH-20WR	2.60	2.34	2.08
IDH-26WR	3.25	2.93	2.60
IDH-34WR	3.80	3.42	3.04
IDH-40WR	4.65	4.19	3.72
IDH-50WR	5.55	5.00	4.44

IDP PLUG CONNECTOR

mates with IDS type connectors

PART #	PRICE/QTY 1-49	50-99	100-UP
IDP-20P	3.95	3.16	2.53
IDP-34P	4.95	3.96	3.17
IDP-50P	5.95	4.76	3.81

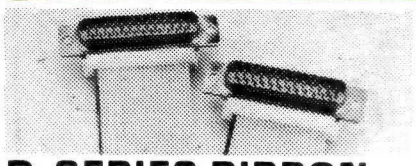


IDD DIP PLUG CONNECTOR

for pluging into IC sockets

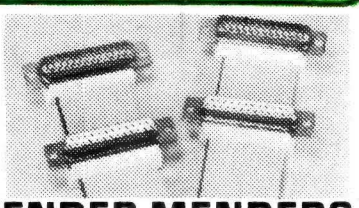
PART #	PRICE/QTY 1-49	50-99	100-UP
IDD-14	1.30	1.17	1.05
IDD-16	1.65	1.49	1.34
IDD-24	2.25	2.03	1.82
IDD-40	3.90	3.51	3.16

RIBBON CABLE ASSEMBLYS



D-SERIES RIBBON CABLES

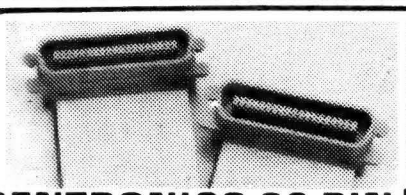
PART #	PRICE
9P-9P	8.00 + .18 per foot
9P-9S	8.28 + .18 per foot
9S-9S	8.56 + .18 per foot
15P-15P	9.72 + .30 per foot
15P-15S	10.10 + .30 per foot
15S-15S	10.48 + .30 per foot
25P-25P	10.50 + .50 per foot
25P-25S	11.10 + .50 per foot
25S-25S	11.30 + .50 per foot
37P-37P	16.44 + .74 per foot
37P-37S	16.95 + .74 per foot
37S-37S	17.80 + .74 per foot



GENDER MENDERS

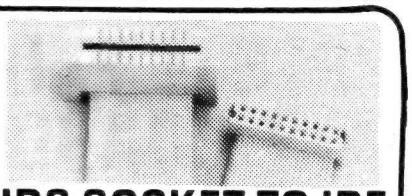
PART # GM—25	PRICE
GM-25	22.50 + .50 per foot

25 pin RS-232 cable with a male and female connector on each end.



CENTRONICS 36 PIN RIBBON CABLES

PART #	PRICE
36P-36P	12.00 + .72 per foot
36P-36S	13.45 + .72 per foot
36S-36S	15.90 + .72 per foot

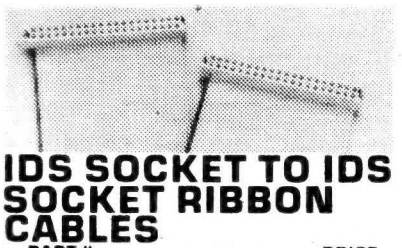


IDS SOCKET TO IDE EDGE CARD RIBBON CABLES

PART #	PRICE
10S-10E	3.05 + .20 per foot
14S-14E	3.35 + .28 per foot
20S-20E	3.75 + .40 per foot
26S-26E	5.05 + .52 per foot
34S-34E	5.85 + .68 per foot
40S-40E	7.00 + .80 per foot
50S-50E	8.50 + 1.00 per foot

CENTRONICS TO IDS-40 RIBBON CABLES

PART #	PRICE
36P-40S	9.50 + .72 per foot

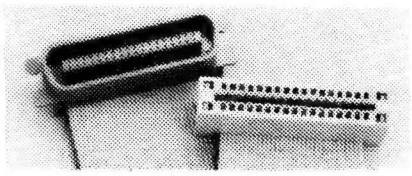


IDS SOCKET TO IDS SOCKET RIBBON CABLES

PART #	PRICE
10S-10S	2.30 + .20 per foot
14S-14S	2.70 + .28 per foot
16S-16S	2.90 + .32 per foot
20S-20S	3.00 + .40 per foot
26S-26S	4.80 + .52 per foot
34S-34S	5.80 + .68 per foot
40S-40S	7.00 + .80 per foot
50S-50S	8.50 + 1.00 per foot
60S-60S	11.60 + 1.20 per foot

IDE EDGE CARD TO IDE EDGE CARD RIBBON CABLES

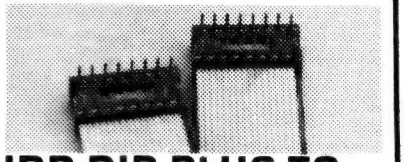
PART #	PRICE
10E-10E	3.80 + .20 per foot
14E-14E	4.00 + .28 per foot
20E-20E	4.50 + .40 per foot
26E-26E	5.30 + .52 per foot
34E-34E	5.90 + .68 per foot
40E-40E	7.00 + .80 per foot
50E-50E	8.50 + 1.00 per foot



CENTRONICS TO IDE-34 RIBBON CABLES

printer cable for TRS-80 computers

PART #	PRICE
36P-34E	10.25 + .68 per foot



IDD DIP PLUG TO IDD DIP PLUG RIBBON CABLES

PART #	PRICE
14D-14D	2.60 + .28 per foot
16D-16D	3.30 + .32 per foot
24D-24D	4.40 + .48 per foot
40D-40D	7.80 + .80 per foot

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PART #	PRICE	10-UP
PPC-301-5	19.95	16.95
PPC-301-10	24.95	19.95

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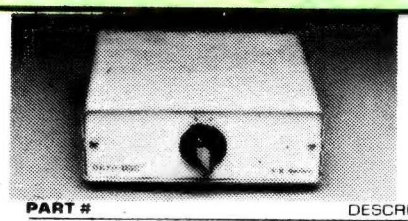
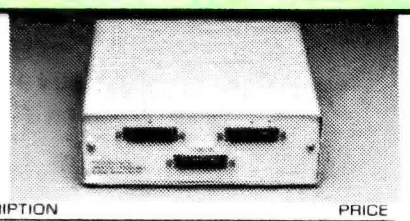
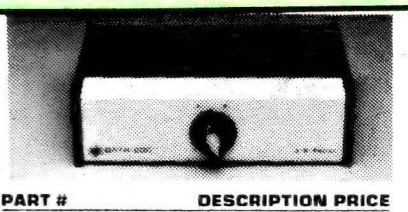




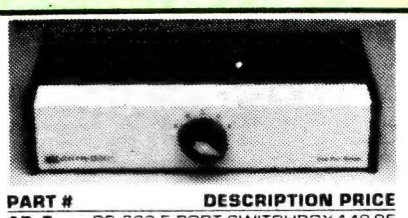
PART #	DESCRIPTION	PRICE
AB-25	RS-232 SWITCHBOX	88.00

switches all 25 lines, two positions for interfacing; two printers to one computer or one printer to two computers



PART #	DESCRIPTION	PRICE
AB-36	PARALLEL SWITCHBOX	138.00

switches all 36 lines two positions for interfacing two computers to one printer or two printers to one computer.



PART #	DESCRIPTION	PRICE
AB-5	RS-232 5 PORT SWITCHBOX	149.95

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Hardin Brothers
Continued from page 167

CTRL and ESC sequences. For example, CTRL-E will take you up a line while you're editing the outline, but to the end of the current line inside the leaf/text editor. This lack of consistency between two closely-associated editors is one of the few things I have found in KAMAS that I dislike. Not all of the commands are dissimilar, but just enough are to cause some unnecessary confusion.

One of the powerful features of KAMAS as an outline processor is the ease with which parts of the outline can be moved around. When the outline is on the screen, only one or two keystrokes are necessary to change the relationships of the branches you have defined. You can easily change the indentations (and therefore the relationships between branches) as well as move a branch to a new place in the outline. The text or leaf associated with that branch moves with it, of course, so you are essentially performing block moves of text without the confusion that such activities can sometimes cause in a normal word processor.

Once an outline is finished, you have several choices of what to do next. You can save it to disk, of course, to be recalled at a later time. You can also print it out (to a printer or a disk file) with or without the outline titles. The KAMAS documentation also explains how to use the outline and its associated text as an appointment calendar, a flash card system, a cardfile, an index, and for several other uses. Some of the uses require extra programming in the KAMAS programming language, others do not.

The most exciting thing about KAMAS is its flexibility and the power of its internal programming language. Much of KAMAS outline processor is written as an application of the KAMAS programming language, and if you have any interest in computer programming, you will soon find yourself playing with this new language.

The KAMAS language is similar to FORTH, it is a threaded, interpretative language, but the power and flexibility of its internal programming language make it exciting.

The KAMAS language is similar in concept to FORTH—it is a threaded, interpretive language—but the command words available, as well as much of the syntax is quite different. Actually, each time you run the KAMAS program, you begin at the interior programming level, but an auto-execution program overlays that level with the outline processor. If you exit from the processor, you are again at the interior level of KAMAS and have the entire language available to you.

The primitive or low-level commands in the KAMAS language were developed for text processing instead of the computer-motor interfacing that was the original impetus for FORTH. For that reason, you'll find elements in the KAMAS language to control the disk, search for strings, delete leaves from a topic, and handle cursor movements on the screen. Like FORTH, KAMAS has several vocabularies, and any program you write becomes a new vocabulary which can be set to execute automatically if you wish.

Though KAMAS is similar to FORTH in structure, it is different enough that an experienced FORTH programmer may have more trouble learning it than someone who has never worked with a threaded language. There are just enough differences between KAMAS and FORTH that an experienced FORTH programmer may find the transition disorienting.

A non-FORTH programmer should have little trouble learning to use KAMAS on any level. The two large volumes of documentation contain several tutorials plus a complete explanation of what is happening each step of the way. After a few hours study and experimentation, as well as following the examples on the computer and seeing what happens when you alter them, you should have no trouble writing simple KAMAS programs. By the time you get to the advanced programming techniques in the second volume, you should be able to make KAMAS do almost anything you wish.

Don't expect KAMAS to become your only programming language, however. While it is rich in words that manipulate text, it seems a little weak in numeric operations. It can, of course, handle numeric problems but not with the convenience and power of other programming languages. But if you have specialized word and string handling problems you need to solve, the KAMAS language might be your best choice for an environment to handle them in.

One of the nice features of KAMAS is that on-line help is always available, no matter where in the system you happen to be. The help commands are particularly useful for a newcomer to KAMAS; they are always out of the way but available as a reference for any KAMAS user. Generally, there are two levels of help available. The first is a list of possible commands in your present situation, the second is a detailed text explaining where you are and what your options are.

One of the most noticeable positive qualities of KAMAS is that it is fast. Though I've only used it for relatively small outlines and files so far, I have never felt that I had to sit and wait for the system to carry out whatever commands I gave it. Partly, this speed is due to the special vocabulary of the KAMAS language—if KAMAS had been written in normal FORTH, I suspect that it would operate much more slowly. Partly, however, KAMAS's speed is because it is not a generic CP/M program, but is specially written (or rewritten) for every machine that it runs on.

KAMAS is currently available for several computers running CP/M 2.2: the complete Kaypro family, the Morrow MD2 and MD3, the Epson QX-10, the Osborne (but without the telecommunications package) and several others. By the time you read this, there should be versions available for many other CP/M machines—call Compusophic and ask. In general, KAMAS requires a 64K Z-80 computer running CP/M 2.2, an 80 x 24 display screen, and (optionally) a printer and RS-232C interface.

Purchasers of KAMAS

Continued on page 174

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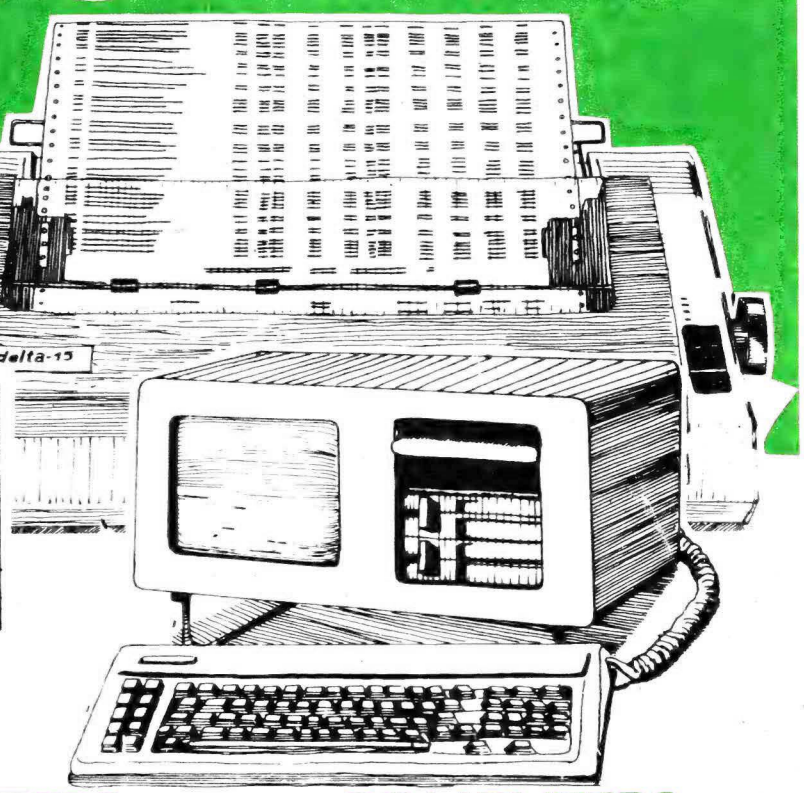

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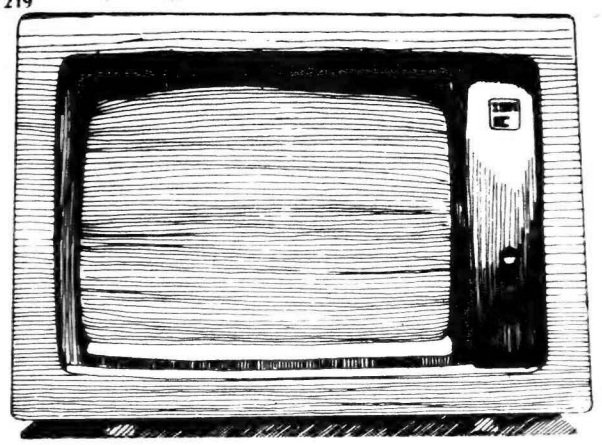

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Singleman Mark V 300 Baud	160	119
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Hardin Brothers
Continued from page 172

receive a free subscription to an occasional newsletter that explains parts of the system that users have questions about and applications that have been developed on KAMAS. Both for its utility as an outline and word processor, and for its power as a complete (and new) programming language, KAMAS is an excellent buy for the price. But plan to spend some time learning to utilize all its power. I've been using KAMAS for a month now, on and off, and I feel that I've barely begun to utilize its full potential.

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New Releases to Public Domain

by Bill Chin

Interrupts

Here's some additions and corrections to the Sig/M and PC-Blue library distribution system.

Steve Peterfreund
Sig/M, PC-Blue
P.O. Box 7788
Nashua, NH 03060
Voice (603)881-7788

John McCulloch
PC-Blue
6312 Fairwood Ave.
Las Vegas, NV 89107
Voice (703)878-9376

If you note any corrections please drop a note to me.
Bill Chin
P.O. Box 2085
Clifton, N.J., USA 07015-2085

Please note in the lower left corner of the envelope the purpose.

New Releases from Sig/M Users Group, Six new releases into the CP/M software environment.

Updates to ZCPR version 3 New FIND utility which allows for squeezed (xQx extensions) to be searched.

Z80 type Encription

WORDSTAR printer utility for set up. Also versions of FORTH languages for the 8080 and 68xxx type cpu's.

SIG/M Vol 200
Utilities for SCPR3 v2
Volume 1 of 3

index	name		size
200.01	CLEARNDIR	.COM	2K
sort & pack utility			
200.03	CMD	.COM	1K
command line processor			
200.02	DPROG	.COM	3K
200.04	DPROG	.HQP	6K
Sets printer, term. also HELP files for DPROG			
200.05	DU3	.COM	12K
200.06	DU3	.HQP	25K
ZCPR3 disk utility. HELP file for DU3 usage			
200.07	MU3	.COM	3K
200.08	MU3	.HQP	5K
Memory utility with HELP file for MU3 usage.			
200.09	SHSET	.COM	1K
Command line definition of a SHELL type command as in UNIX.			
200.10	VFILER	.COM	11K
200.11	VFILER	.HQP—	14K
VFILER - file handling utility and HELP file for usage.			
200.12	VLIB	.HQP	8K
200.13	VLIB	.REL	2K
Virtual LIBrary Utility and HELP file for usage			
pa			
200.14	VMENU	.COM	6K
200.15	VMENU	.HQP	20K
200.16	VMENUCK	.COM	3K
Virtual MENU utility with HELP usage and the verify utility for the MENU's			
200.17	Z3LIB11	.REL	8K
200.18	Z3LIB	.HQP	2K
200.19	Z3LIB1	.HQP	19K
200.20	Z3LIB2	.HQP	4K
200.21	Z3LIB3	.HQP	13K
200.22	Z3LIB4	.HQP	12K
Updates for ZCPR v3 Library includes HELP files			
200.23	Z3UTIL3	.HQP	5K
Updates for UTILITY modules			

SIG/M Vol 201
Utilities for ZCPR3
source code
Volume 2 of 3

index	name		size
201.01	CLEANDIR	.MQC	8K
housekeeping module			
201.02	CMD	.MQC	4K
command module			
201.03	DEBUGRCP	.AQM	20K
debugger module			
201.04	DPROG	.MQC	13K
201.05	DU3	.MQC	54K
DU - disk utility			
201.06	MU3	.MQC	11K
201.07	SHSET	.MQC	3K
201.08	VFILER	.MQC	58K
screen driven file utility			
201.09	VMENU	.MQC	36K
201.10	VMENUCK	.MQC	8K
screen driven menu utility			

SIG/M Vol 202
ZCPR3 Library Source Code
Z80 Public Key Cryptography
Wordstar printer utility

index	name		size
202.01	ANYCODE	.ASM	3K
202.02	ANYCODE	.DQC	14K
Sets printer from Wordstar Public key cryptography.			
202.03	RSA/T12	.LBR	75K
202.04	VID1	.MAC	1K
202.05	VID2	.MAC	1K
202.06	VID3	.MAC	1K
202.07	VID4	.MAC	1K
202.08	VID5	.MAC	1K
202.09	VID6	.MAC	1K
202.10	VID7	.MAC	5K
202.11	VID8	.MAC	1K
202.12	VID9	.MAC	2K
202.13	VIDA	.MAC	1K
202.14	VIDB	.MAC	1K
202.15	VLAT	.MAC	1K
202.16	VLGXYMSG	.MAC	2K
202.17	Z3MAC	.LBR	99K
ZCPR3 library of routines for screen manipulation			

SIG/M Vol 203
CP/M 80 to CP/M 86 Translator updated FIND utility for searching strings. Allows Squeezed file searching

index	name		size
203.01	80T86	.LBR	114K
8080 to 8086 translation utility			
203.02	CNVADV	.HLP	40K
advanced CNVRT HELP			
203.03	FFYNDE	.A86	25K
203.04	FFYNDE	.ASM	23K
203.05	FFYNDE	.CMD	5K
203.06	FFYNDE	.COM	4K
updated FIND utility - with the capability of generating a cross-reference listing...even SQ type file searches are allowed. An 8080 and 8086 version is supplied by Dr. H. McIntosch (he has filled a void in FIND).			

SIG/M Vol 204
Forth-83 for CP/M 80 Version 2.0

index	name		size
204.01	F83	.COM	24K
Forth system module			
204.02	README	.8Q	13K
v 1.0 Forth 83 documentation			
204.03	F83-FIXS	.TQT	4K
changes from v 1.0			
204.04	BASIC	.BQK	5K
BASIC compiler in F83			
204.05	CLOCK	.BQK	3K
calendar example			
204.06	CPU8080	.BQK	10K
8080 dependent code			
204.07	EXPAND80	.BQK	3K
source to EXPAND.HUF			
204.08	EXTEND80	.BQK	9K
extensions source			
204.09	HUFFMAN	.BQK	13K
Huffman code compression program			
204.10	KERNEL80	.BQK	63K
kernel source			
204.11	META80	.BQK	13K
metacompiler source			
204.12	UTILITY	.BQK	37K
utility source			

SIG/M Vol 205
Forth-83 for 68000 Version 2.0 similar to volume 204 instead it is used on the Motorola 68xxx series microcomputer chip series.

index	name		size
205.01	F83	.68K	29K
Forth for a 68k cpu			
205.02	README	.6Q	13K
205.03	F83-FIXS	.TQT	4K
205.04	BASIC	.BQK	5K
205.05	CLOCK	.BQK	3K
205.06	CPU68000	.BQK	16K
68000 dependent code			
205.07	EXPAND68	.BQK	3K
205.08	EXTEND68	.BQK	9K
205.09	HUFFMAN	.BQK	13K
205.10	KERNEL68	.BQK	61K
205.11	META68	.BQK	14K
205.12	UTILITY	.BQK	36K

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ROBOTICS

"Designing and Building Your Own Robot"

Part III

by Bill Dodd

The main interest in robotics over the past several years has been in the industrial application of 'robotic' or 'programmable' manipulators. The art and science of manipulator design has accordingly become one of the most developed, thought-out, and applied branches within the category of robotics.

A TRANSFORMING PERSPECTIVE

Even now; however, organizations representing robotics are considering the addition of mobile robots (including personal, domestic, and commerical service) into one of their categories of interest. It will be interesting to see the transforamtion of attitude toward the mobile robot - which ultimately will be the prime category of interest - industrial as well as domestic/commercial. Indeed, in years to come, the manipulator will become just one element of the overall interest, not THE prime element. The robot as a system (hardware and software) will become the entity of interest and comparison.

In domestic and commercial mobile robotics we could accurately say that we are as developed (in the overall system capability) as the first wheel barrow in comparison to current land based transportation or as developed as the Wright Brothers first air plane in comparison to todays air transportation. However, we regard the wheel employed on our modern day land vehicles and the wing on the airplane as only one component (though absolutely critical to performance) of the transportation system. Applying this comparison then, the whole working mobile domestic or commercial (office/shop/store/farm/road building) robot will be as much more sophisticated than the current state of the art manipulators as the automobile is in comparison to its wheel and transmission system. Indeed, the working robot if the future will have to include manipulators, but must as well include pattern recognition, power distribution, mobility control, and task related software.

Therefore we see the manipulator as one part of the robot system - a critical MUST part; and with the state of the art in industrial robotics as advanced as it is, we will find manipulator design information easier to obtain than mobile robot design system design.

Most manipulators on the market are, of course, industrial units. Industrial production cost savings and gained by robotics application more than compensate for the development and manufacture of expensive industrial manipulators. This is indeed why this key robot component is so very prevalent in industry.

There are also a growing number of educational robot arms on the market. In fact, some of these have been installed and used in personal robots. The author is somewhat familiar with several of these units. Most of these arms use a combination of electrically driven servo motors and/or stepper motors and most are excellent arm units for experimentation and light load lifting within their respective price ranges. Hydraulic and pneumatic manipulators are also becoming available, and will greatly improve the choices available in building or customizing personal robots.

Our goal in this series, however, is to build our own manipulator; so we will leave the factory manufactured arms to those desiring a complete manipulator (kit or assembled).

MANIPULATOR DESIGN (Precision vs. economy)

The following manipulator is designed for use on the Bulldog robot described in last month's issue (Part III of this series). Keep in mind that it is very dificult to provide a less than $50.00 manipulator for a less than $100.00 robot - so don't expect a product nearly as sophisticated nor as accurate as one of the personal robot arms currently on the market. The arm shown uses a D.C. gear motor for application in the shoulder. The hand is a simple solenoid arrangement. The overall assembly is operable as a demonstrator and through limited in use, it does provide a test bed for manipulator control and does as well give the Bulldog a manipulator useful for testing of software concepts. Though the manipulator shown is non-precision, attention to detail will make it better. Good working habits in part forming and assembly will pay dividends, so take the time and effort to make parts as close to tolerance as possible, especially if you desire to maximize results!

DESIGN THEORY:

As mentioned above, design of a precision manipulator is a detailed process with many factors for consideration, and one that is much beyond the scope of intent of these articles. So, rather than providing an extensive review of state-of-the-art manipulator design theory here, we invite you to the many excellent technical books, magazines, and articles by experts in the field.

The manipulator designed below is very simple to make and install. The degree of control possible will mainly depend on software as well as feedback devices that you add (more on that in a future article).

The manipulator, or Arm, is a simple two axis system, with the second axis provided by the motorized base. The base provides control of horizontal positioning; the shoulder provides vertical, and the gripper provides grasping.

The arm is constructed from the components listed on Dwg #1. These components should be readily available at your local hardware store and/or electronics surplus store. A list of surplus and parts sources is given at the end of this article. If you know of good new/or surplus parts stores in your area, please drop a note to me and we will add the company to our source list at the end of a future article. And, while still on the subject, as all do it yourself personal robot builders have (or will) find out, the hardest part to locate is always 'THE GEAR REDUCER or GEAR MOTOR COMBINATION THAT PROVIDES THE TORQUE DESIRED, AT THE SPEED DESIRED, USING THE LOWEST POSSIBLE CURRENT DRAIN, WITH EASY MOUNTING AND ALLIGNMENT CHARACTERISTICS, AVAILABLE IMMEDIATELY FOR A TOLERABLE (means low!) PRICE RANGE.'

The gear reducer for the shoulder should result in a final speed of from .30 to 1 revolution per second, (or 20 to 60 RPM), depending on the speed and positioning accuracy you desire. The gear motor used could be an integral (one piece) unit (as used in the example), or a motor coupled to a gear reducer (to lower the lifting speed and increase torque - lifting power.) Of course the speed and torque can be varied somewhat with variation of voltage applied to the motor. The actual gear reducer ratio needed depends on the motor type and speed, and the torque capacity of the gear component depends on the load to be lifted and the drive motors capacity.

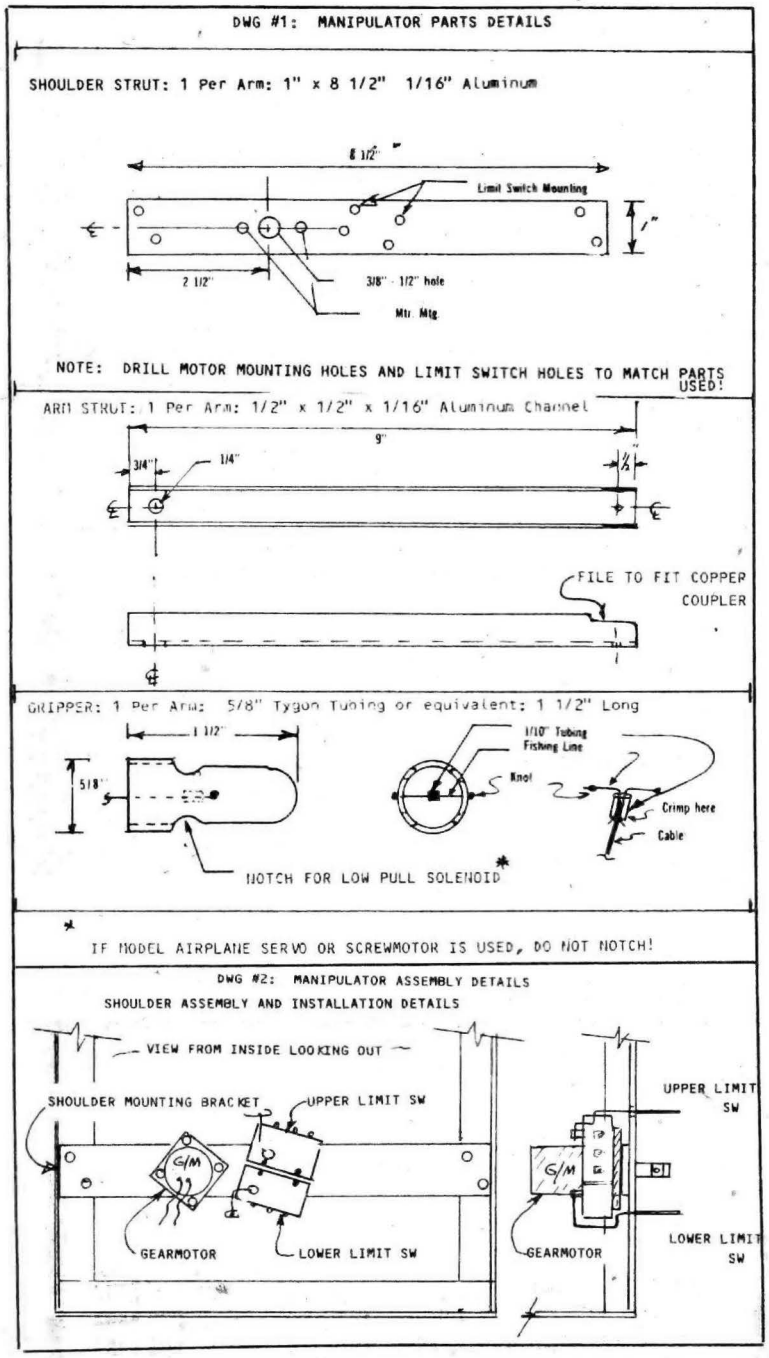
SHOULDER CONSTRUCTION:

The shoulder gear motor shown mounts on a strut that in turn mounts in the Bulldog. This shoulder rotates at about 20 RPM. You should mount stop limit switches on the shoulder. These are the wire operated type allowing actual arm movement to operate them! This prevents wrapping up solenoid wires (used to operate the gripper.) Note the limit switch wiring that takes advantage of dynamic braking operation. You can use the same electrical arrangement in your base wiring also if you have installed bumper or photocell switches.

ARM AND GRIPPER DESIGN

The arm is a simple 1/2"

Continued on page 177



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Dodd
Continued from page 175

aluminum channel with a solenoid attached. The solenoid activates a mini-gripper that is either open or closed. You can replace the solenoid with a screw motor, but look for one that is geared down and very light weight. A slot car motor should work, but will be very fast and require gearing down. Mount the motor near the shoulder joint in order to reduce the shoulder load of the arm itself and use a screw/nut to pull the cable. Use limit switches if a motor is used.

The gripper shown is formed using a one piece plastic tube. This gripper design was employed on the early model Hobby Robot Co. Rabbit (which has since been replaced by a redesigned, lightweight servo-operated aluminum gripper.)

GEAR MOTOR SELECTION

We will leave the actual gear motor selection and mounting to the builder as an 'educational' project! The simplest way is to use the integral unit. The gear motor used in the arm we constructed is a un-labeled 60 RPM aircraft motor, 24VDC, with a 1/4" shaft and 4 hole mounting flange. Some of the manufacturers of this type of gear motor are Globe, Western Electric, Bodine, Dlco, General Electric, Barber Coleman, Teledyne Pacific Industries, Singer-Diehl, Oster and Wilson of Cleveland. These types of gear motors usually cost over $100.00 new; however, they are quite often available from surplus suppliers in the $10.00 to $30.00 range.

There are alternative and less expensive ways to provide the slow (20-60 RPM) shoulder rotation. Some possibilities are gear motors from toy cars, robots, etc. The gear reducer from the Big Track Dumper, for example, can be used to drive a window casement gear reducer for final output to the arm. Look around for other combinations. You'll be surprised at just how easily you can come up with the shoulder drive!

GRIPPER CONSTRUCTION

To build the gripper, cut a 1 1/2" secton of 5/8" O.D. tubing (Tygon or equivalent). Cut two long notches - foming the two hand pieces or grippers. The tubing provides the two gripper halves as well as the spring action to return the halves to open position when the solenoid is de-energized. Thread a 6" piece of fishing line through the center of the two gripper halves. Tie knots on both ends of the fishing line. Take a 6" piece of metal braided cable (used for fishing or model aircraft work) and crimp one end to the fishing line. Do this via a 1/4" long piece of 1/16" copper tubing. Keep the crimp close to the end of the cable and pull all slack out of the fishing line with the gripper halves fully open. (See Dwg.)

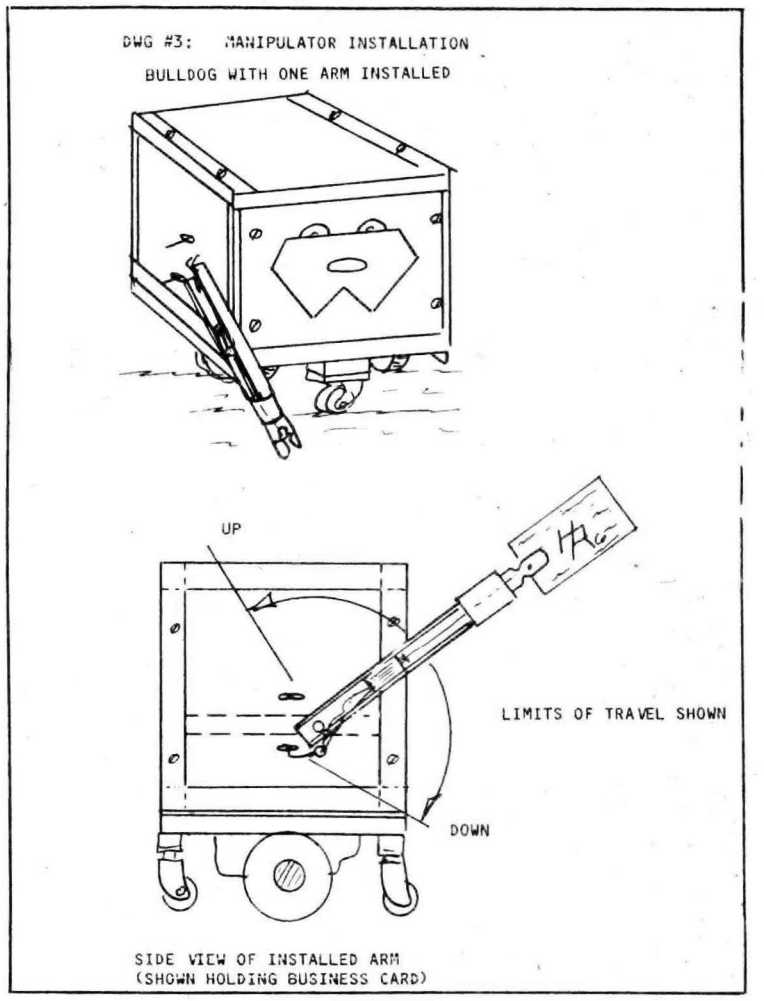
ASSEMBLY INSTRUCTIONS

Assembly assumes all parts are first constructed via drawings and notes attached. We also assume the Bulldog Robot base and body assembly is completed per the December article in Computer Shopper.

SHOULDER ASSEMBLY

1. Mount gear motor (or assembly) to shoulder bracket.
2. Mount two limit switches to shoulder brackets. Insure the switch's wire levers are arranged as shown.
3. Remove the side panel of Bulldog (both panels if two arms will be mounted) and install the shoulder bracket at mid height or lower as desired. Drill four holes, as shown, in the vertical struts and mount the shoulder bracker in the robot using flat head shet metal screws, machine screws or pop rivets. Drill matching holes in the cover!
4. Replace side cover and insure shoulder shaft and limit switch levers clear prepared holes properly.
5. Construct a second four relay card (See Dec. issue) for running the shoulder motor and hand solenoid. If you are in a hurry to test your arm, you

Continued on page 180



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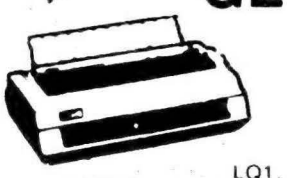

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Dodd

Continued from page 177

can temporarily use the dual base motor driver.

6. Wire the shoulder motor to one of the motor driver relay pairs. Wire the limit switches into this circuit as shown.

ARM ASSEMBLY

Once the gripper assembly is complete, insert the gripper tube halfway into a 5/8" copper coupler (used for water pipe assembly). Push the coupler onto the arm strut. File the 1/2" arm strut channel to fit into the coupler snugly at the halfway point in order to butt up against the end of the gripper. Drill a mounting screw hole for permanent attachment.

Uing a vise, press the solenoid into the arm strut and secure with a 1" hose clamp. Withdraw the solenoid pole 3/16" and with the gripper fully open (AND with all slack taken out of the cable), cut the cable to match and solder the end to the brass washer on the solenoid. Test the solenoid and make final adjustments by sliding the gripper out of the coupler. Secure with #6 metal screw through the coupler and arm strut. The arm can now be mounted into the shoulder shaft.

ARM INSTALLATION

Attach the arm to the shoulder shaft using the collar set screw. Bend the limit switch trip wires to activate when the arm nears its limits (near floor level and near desired reverse position. This may be full up or back behind the robot.)

TESTING

With the arm wired to a relay driver board, test the arm functions. Note that the dynamic braking circuit allows instant braking when the motor is de-energized. You will have to rewire the relays if you want the shoulder motor to coast. Make final adjustments to the end of travel limit switches on the shoulder.

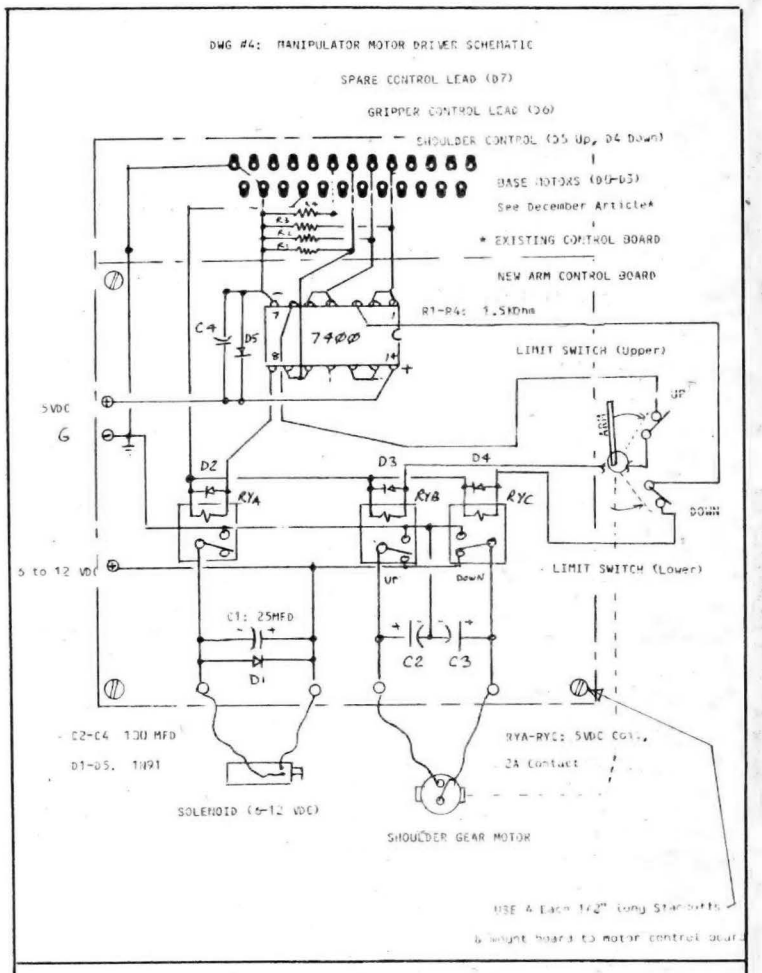
OPERATIONS AND PROGRAMMING

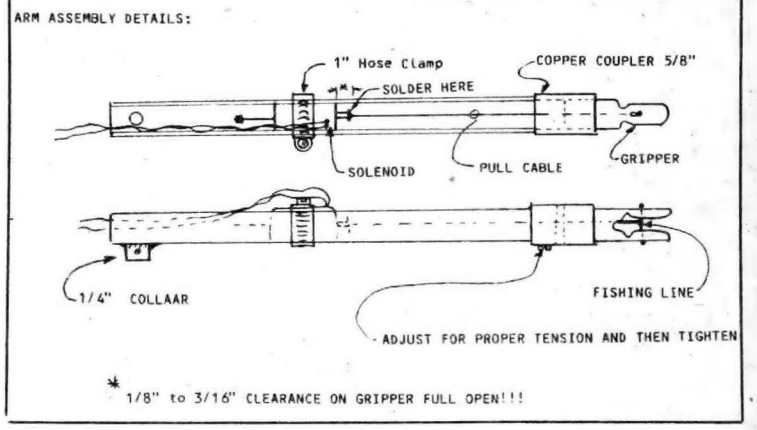
The Bulldog with arm can now be operated via a manual pendent controller, the previously described port simulator, or the Computer Interface (see prior articles). Rewrite the base operation software to actuate the arm instead of the base and/or in addition to the base. Test your arm to see how precisely you can repeat the same positioning. One way to insure proper repetition is to drive the arm to the limits, time out and then drive to the desired position.

Though the Bulldogs' new arm is limited in gripping power (can't hold onto a football!) it is useful in exploring just what can be done with timing loops and computer software. You can learn how to get around some of the mechanical problems (i.e. compensate for gear lash via programming, etc.) using software techniques. With a little practice you should be able to maneuver the little robot across the room and pick up a (vertically supported) business card!

PARTIAL SOURCE LIST FOR ELECTRICAL AND MECHANICAL PARTS: Parts used on the Bulldog (shown in parenthesis) came from the companies listed below:

1. (12VDC Solenoids): Austin Electronics: 6115 B, Jimmy Carter Blvd., Norcross, GA 30071, 404-499-8697. A range of electronics parts, gear motors and solenoids. RE: Bob.
2. (Wheels & Gear Motors): Herbach & Rademan, 401 East Erie Ave., Philadelphia, PA 19134, all sorts of mechanical and electrical parts.
3. (Big Track Motor and Gear Motors): Edmund Scientific, 101 E. Gloucester Pike, Barrington, NJ 08007, 1-800-259-6173
4. (12VDC Relays & I.C.s): Delta Electronics, 5151 Buford Hwy., Atlanta, GA 30340: (Electronic Parts, relays, motors, solenoids, etc.) RE: Aman and Jimmy. ●





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TYPE: financial software package, also includes how-to software and games
COMPUTER: TRS-80 Model I & III
DESCRIPTION: This package consists of eight personal programs and 2 games: 1) BAP$1040 Income Tax & Tax Planner; 2) BAP$TIPS: 3) Income & Deductions Tax File; 4) Business Mileage; 5) Stock Charting; 6) Mailing List; 7) Financial Statement; 8) Monthly Income/Expense; 9) Oscar Draft, Special Mission Pilot; 10) The Wizard's City.
PUBLISHER: BAP$ (Business and Pleasure Software) 6011 San Felipe, Houston, TX 77057
COST: $34.95 (including disks. Add $2 shipping)

NAME: ALGEBRA BILLIARDS DOS: Apple DOS 3.3
TYPE: tutorial
COMPUTER: APPLE® II + /IIe/IIc
DESCRIPTION: This program is designed to instruct the mechanics of algebra variable substitution. It is a drill for those familiar with the subject, a tutorial adventure for those just beginning to understand algebra and a game of billiards for anyone. Points are accumulated for correct answers. Should an incorrect answer be given, the program becomes tutorial by solving part of the equation, thus reducing its complexity and the student can attempt another try at the answer.
PUBLISHER: CURRICULUM APPLICATIONS, P.O. BOX 264, Arlington, MA 02174-0264
COST: $24.95/diskette

NAME: TEACHER'S RECORD BOOK DOS: APPLE DOS
TYPE: utility program for teachers
COMPUTER: Apple II + or an Apple IIe with 1 or 2 disk drives and an optional printer in Slot #1.
DESCRIPTION: This program is designed to keep track of information most often used by teachers about their students. The information includes: name, student ID#, phone number, status, exam scores, quiz/homework scores and attendance.
PUBLISHER: GLOW Software Systems, 7001 Amherst Drive, Little Rock, AR 72205
COST: After January 1, 1985, the regular price is $124.95.

NAME: TEXTWRITER PLUS 64
TYPE: Word Processor
COMPUTER: Timex/Sinclair 2068
DESCRIPTION: A word processor using the Timex 512 x 192 64 column display. It uses the AERCO Centronics interface to print in any width to all compatible printers with a right justify option. Editing features include add, delete, re-format, block move, center and tab. The program is powerful and very easy to use. Complete user manual included.
PUBLISHER: Robert Fingerle, 39639 Embarcadero, Fremont, CA 94538
COST: cassette based, $29.95

NAME: "WHO'S NUMBER 1? FOOTBALL" DOS: 1.3
TYPE: sports game
COMPUTER: TRS-80 MODEL III/4
DESCRIPTION: In this program, you can create mythical matchups or replay the greatest games in football history. You are the coach and the quarterback, calling the offensive plays and creating a defensive game plan. Anything that can happen in real football can happen in this game.
PUBLISHER: Computer Sports Games, 1203 N. Palm Drive, Plant City, FL 33566
COST: $39.95 (includes the game, 28 great teams, 12 USFL teams ratings program and stat printing program)

NAME: CLIPPER
TYPE: data base system
COMPUTER: IBM PC and true compatibles
DESCRIPTION: Clipper boosts the speed and efficiency of dBASE applications and offers software developers a superior alternative to using existing run-time modules.
PUBLISHER: Nantucket Inc., 20456 Pacific Coast Highway, Malibu, CA 90265
COST: $695

NAME: THREE NEW "MATH POWER" PROGRAMS
TYPE: Educational
COMPUTER: Apple and IBM
DESCRIPTION: Three new programs have been added to the Math Power series: Beano, where players develop skills of mental computation and strategy by combining numbers mathematically to match numbers on a computer-generated grid; Amusement Park, a business simulation game that develops skills of numeration, computation, and logical; and Number Chase, a game where players uncover secret numbers to enhance their math skills.
PUBLISHER: SRA Software, 155 N. Wacker Dr., Chicago, IL 60606
COST: $39.95

NAME: Workstation BASIC™ DOS: 2.X and 3.X
TYPE: a complete BASIC programming package
COMPUTER: IBM PC, PC/XT, PC/AT
DESCRIPTION: The package consists of an interactive BASIC compiler/interpreter, a command processor, and various utility programs, including SORT, PRESORT, and INDEX.
PUBLISHER: American Business Computer, 16000 W. Nine Mile Road, Southfield, MI 48075
COST: $695 per system; "run time" version $450

NAME: Survey Taker DOS: Apple DOS
TYPE: Educational software
COMPUTER: Apple II
DESCRIPTION: Designed for children 9 and up, this program teaches children how to take their own surveys and print out the results. Children learn analysis of simple statistics while improving table and bar graph reading skills.
PUBLISHER: Scholastic, Inc., 730 Broadway, New York, NY 10003
COST: $24.95

NAME: Elite Retailer DOS: MSDOS
TYPE: Retail management software program
COMPUTER: IBM PC and compatible
DESCRIPTION: This program is a point of sale retail management system. Its features include integrated programs that transform an IBM PC to a cash register, sales invoice or receipt printer, inventory control system and charge account recorder. It is also capable of reading UPC bar codes, conducting sales commission accounting and generating operating reports.
PUBLISHER: Elite Software Systems, 300 Orchard City Dr., Suite 137, Campbell, CA 95008

NAME: HOME POWER and ADVENTURES IN KNOWLEDGE DOS: Apple DOS
TYPE: educational series of software
COMPUTER: Apple II
DESCRIPTION: The HOME POWER series helps children ages eight and older and adults develop essential skills in using productivity tools such as data base managers and graphics programs. The initial products in this series are FRIENDLY FILER and EASY GRAPH. ADVENTURES IN KNOWLEDGE games encourage students to read books and to develop essential reference skills. The first two software-books in this series are SECRETS OF SCIENCE ISLAND and TREASURE HUNTER.
PUBLISHER: Grolier Electronic Publishing, Inc., 95 Madison Avenue, New York, NY 10016
COST: Suggested retail price of the first four programs is $39.95

NAME: Babysitter Volume 2 DOS: C-64
TYPE: educational
COMPUTER: Commodore 64
DESCRIPTION: Designed for pre-school and early school-aged children, this volume contains four programs to teach children elementary skills in numbers and logic: Clarity Clock; Krazy Kaleidoscope; Monkey Maze; and Nutty Numbers
PUBLISHER: Soft Magic Corporation, 1213 W. High St., Bryan, OH 43506

NAME: GarageKeeper Jr DOS: PC-DOS 2.x, MS-DOS 2.x, CP/M 2.2
TYPE: automotive software
COMPUTER: IBM PC/XT/AT and compatibles, TI Professional and other MS-DOS machines and the Kaypro, Morrow and other CP/M machines
DESCRIPTION: Multiple pricing, labor billing and optional service station daily sheet or German number sorting are included in a system that performs estimates, invoicing, inventory control, purchase orders and receivings.
PUBLISHER: Computer Assistance Inc., 82277 Weiss Road, Creswell, Oregon 97426
COST: $600 for TI, IBM, Kaypro, Morrow; $750 for other Z-80 machines

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NAME: NMI Personnel Searcher DOS: Xenix 2.4c or higher; MS-DOS 1.2 or higher
TYPE: Personnel management software
COMPUTER: IBM PC
DESCRIPTION: This program is designed to be useD by employment agencies, temporary placement agencies and in-house personnel departments. Once the initial data base is established, data entry provides a large file of applicants and job orders. A search function allows the comparison of both files in order to generate successful job matches.
PUBLISHER: Norton/Murphy International Inc., 176 Chalfont Road, Chalfont, PA 18914
COST: $1495

NAME: Active Trace DOS: MS-DOS
TYPE: debugging tool
COMPUTER: IBM PC
DESCRIPTION: Active Trace lets you see inside your program as it runs. Automatically, any or all variables (and functions) are followed and displayed, along with their current value and line number, on the screen, printer, or disk. There is no need to manually single-step.
PUBLISHER: Awareco Active Software, 38401 S. Highway One, P.O. BOX 695, Gualala, CA 95445
COST: The complete package retails for $79.95

NAME: ColorBIZ Loan DOS: PC-DOS and BASIC
TYPE: Business or personal finance management
COMPUTER: IBM PC/XT or any MS-DOS compatible microcomputer
DESCRIPTION: ColorBIZ Loan stores loans for instant analysis, figures total interest and principal paid, prepares budgets, determines ballon payment requirements, and much more.
PUBLISHER: ColorCorp, 208 North Berkshire, Bloomfield Hills, MI 48013
COST: $44.95

NAME: OneShot DOS: MSDOS
TYPE: utility
COMPUTER: IBM PC
DESCRIPTION: OneShot provides the missing link between the mainframe and the MicroComputer and fills the gap in moving information from the Mainframe data base to local productivity tools. It makes central information available for local manipulation without re-typing. OneShot is a translator that takes

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files loaded from a mainframe and puts them in a form that a spreadsheet such as a Lotus or data base can directly use.
PUBLISHER: DataViz, Inc., P.O. BOX 1319, Norwalk, CT 06856
COST: $195-retail

NAME: DATEBOOK II DOS: CP/M, MS DOS/PC DOS, UCSD PASCAL
TYPE: utility program for management
COMPUTER: IBM PC, Apple, Hewlett Packard, Xerox, Victor 9000, Televideo, Kaypro, Morrow Micro Decision, NEC PC 8000, DEC Rainbow, Zenith, Otrona, Eagle, Epson
DESCRIPTION: Datebook II is designed for physicians, dentists, lawyers, salespeople or any office where time management is critical. Appointments can be scheduled for up to 27 different people, rooms, or pieces of equipment. Copies of daily appointments can be printed quickly.
PUBLISHER: Digital Marketing Corporation, 2362 Boulevard Circle, Walnut Creek, CA 94595
COST: $295

NAME: INVESTMENT and STATISTICAL SOFTWARE package DOS: MS DOS.
TYPE: personal finance
COMPUTER: Commodore, Apple, Radio Shack, and IBM PC
DESCRIPTION: This software package contains 50 programs for statistical forecasting, stocks, bonds, options, futures and foreign exchange. The 220-page handbook lists, explains and gives sample RUN illustrations for all fifty BASIC programs for profitable planning and forecasting.
PUBLISHER: PRGRAMMED PRESS, 2301 Baylis Ave., Elmont, NY 11003
COST: $100 for package; $19.95 for handbook

NAME: LYNN'S PAYROLL SYSTEM DOS: TRSDOS
TYPE: payroll management
COMPUTER: TRS-80
DESCRIPTION: This program allows fast and accurate payroll calculation, posting and check printing.
PUBLISHER: LYNN COMPUTER SERVICE, 6831 West 157th Street, Tinley Park, IL 60477
COST: $49.95

NAME: PCBANNER DOS: PCDOS
TYPE: Banner
COMPUTER: IBM PC and compatibles
DESCRIPTION: A banner-printing program featuring large 6½-inch high characters for business signs and personal posters. Typical banner applications include merchant window signs, salesperson displays, school/church fund raisers, club posters, and personalized greeting cards.
PUBLISHER: Williams Software & Services, 1114 Pusateri Way, San Jose, CA 95121
COST: $30

NAME: Personal QWERTY DOS: PC DOS and MS DOS
TYPE: word processor
COMPUTER: 128K IBM PC, PC-XT, Compaq, or other work-a-like, with at least one SSDD diskette drive required.
DESCRIPTION: This is a low-cost word processor that features automatic continuous screen formatting: single keystroke character, word & line operations, dynamic tabs and centering unlimited margin and tab stop changes: flexible cut & paste and user of ASCII files and much more.
PUBLISHER: HFK Software, Inc., Old Danbury Road, Danbury, NH 03230
COST: $99 including mail-merge and back-up diskette

NAME: My Office DOS: Macintosh
TYPE: Basic office software package
COMPUTER: Macintosh
DESCRIPTION: It is a data base with graphics capabilities. You can design your own letterhead, forms, enter data, and file them anyway you like.
PUBLISHER: DataPak Software Inc., 14755 Ventura Boulevard, #1-774, Sherman Oaks, CA 91403
COST: $79.95

NAME: ELECTRONIC BILLBOARD
TYPE: advertising program
COMPUTER: Timex/Sinclair 1000
DESCRIPTION: Program can produce animated video advertisements for store windows, trade shows, exhibits, etc. Create full screens of LARGE, highly legible text and symbols. Requires only 2K.
PUBLISHER: Vidiom, P.O. Box 3118, Wayland Sq., Providence, RI 02906-0118
COST: $14.95 postpaid

NAME: GANTT—PACK VERSION 3 DOS: MSDOS AND PCDOS 2.0 and TRSDOS
TYPE: business planning, scheduling, and project management software package
COMPUTER: IBM PC and TRS-80 Model I/III and II/12
DESCRIPTION: This package helps organizations plan, schedule and manage their activities and people more effectively. Data on tasks are entered quickly and are readily changed to reflect shifting schedules and new tasks.
PUBLISHER: Gantt Systems, Inc., 495 Main Street, Metuchen, NJ 08840
COST: full program and documentation $225.

NAME: Small Fortune Auto-Ledger DOS: 1.0, 1.1, 2.0
TYPE: general ledger and financial manager
COMPUTER: IBM PC
DESCRIPTION: This program includes the following: simple data entry with instant account number verification and current balances; self-balancing Journal/2 Entry Module:on-screen helps and much more.
PUBLISHER: Emerald Software, Inc., 2416 Warren Avenue North, Seattle, Washington 98109-2024
COST: Suggested retail price $295

NAME: Chemtutor DOS: Extended Basic Module or MSDOS and advanced BASIC
TYPE: educational tutorial
COMPUTER: TI-99/4A or IBM PC
DESCRIPTION: The Chemtutor Series of programs was designed for use in a first chemistry class (grades 9-12). In each program, the user may select the number and type of problems to be solved, and the end of each session, the average score will be displayed. The programs are simple to use and require no computer experience.
PUBLISHER: Data Systems Computer Software, 2214 W. Iowa, Chicago, IL 60622
COST: TI version $12 each, $70 complete; IBM PC verison $18 each, $100 complete

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NAME: Skokie Software CPA package DOS: 1.x or 2.x, 64K and advanced BASIC
TYPE: Application Software for Auditors and Accountants
COMPUTER: IBM OR IBM compatible
DESCRIPTION: The CPA package has two major parts: The Random Number Generator will select, sort, and print a listing of random dates, document numbers, or dates. The Loan Amortization System calculates any loan variables and prints amortization tables for constant or uneven payments, with annual totals, in a choice of formats.
PUBLISHER: Skokie Software, 9520 Kedvale, Skokie, Illinois 60076
COST: complete with documentation $95

NAME: Personal Social Register
TYPE: Automated Telephone Directory
COMPUTER: TI99/4A
DESCRIPTION: An automated telephone and address directory is the least of this programs capabilities. Data searching, event remembering, personal filing, and much more make organizing your personal life and social responsibilities much easier. Upcoming events mode lets you know when anniversaries, birthdays, or dinner parties are approaching.
PUBLISHER: Ridge Services, 170 Broadway, Suite 201, New York, NY 10038
COST: $25

NAME: FirsTime DOS: MSDOS
TYPE: Syntax Directed Editor
COMPUTER: IBM PC/XT/AT and their compatibles
DESCRIPTION: This program knows the rules of the language being programmed and checks statements as they are entered. If it spots an error it informs the programmer and gives him a chance to correct it.
PUBLISHER: Spruce Technology Corporation, 110 Whispering Pines Drive, Lincroft, NJ 07738

NAME: Triple Play Game Disk Number One DOS: PASCAL
TYPE: game
COMPUTER: Macintosh
DESCRIPTION: This package includes three board games for the 128K or the 512K Macintosh: Backgammon; Mancala; and Deduce. Each game offers the player a choice of skill levels: beginner, intermediate, or expert. The information menu offers a brief history of the game, the rules of play, and detailed, specific instructions for the Mac environment.
PUBLISHER: Stel Enterprises, P.O. Box 6354, Lafayette, IN 47903
COST: $39.50 includes shipping and handling

NAME: Basrum DOS: TRSDOS
TYPE: linking loader and library manager
COMPUTER: TRS-80 Model I and III
DESCRIPTION: Basrum allows the user to store subroutines in "library" files, separate from the programs. These files are universally available to all Basic programs; any program can load any subroutine at any time. Subroutines that have been loaded may be deleted from memory at any time or retained in memory for use by later programs.
PUBLISHER: Wiley, Inc., 841 Bishop Street, Suite B-2, Honolulu, Hawaii 96813
COST: $149.50 including global editor

NAME:All-About Dinosaurs Computer Set
TYPE: Educational
COMPUTER: Available on Apple, Commodore-64, Pet, TRS-80, Atari and IBM
DESCRIPTION: This reading program presents the dinosaurs of prehistoric times in an unusual manner. Through computer graphics, the sizes and shapes of the giant reptiles are compared. It provides the student with general information and descriptions of the various types of dinosaurs. After information is presented, questions are asked and a score is tabulated. If a total score reflects unsatisfactory comprehension, the student is sent back to the problem section for review.
PUBLISHER: Orange Cherry Software, P.O. Box 427, Department A, Bedford Hills, New York 10507
COST: Complete set of 2 Cassettes $28; complete set of 1 Diskette $34

NAME: Compu/CHART
TYPE: stock analysis program
COMPUTER: All CP/M systems
DESCRIPTION: Compu/CHART plots three moving averages, recomputing them with each new entry; allows trial entries; uses the entire 80-column screen to plot the action of 73 trading days; marks last trade level; status line indicates market condition; support and resistance prices, and much more
PUBLISHER: NewTEK Industries, P.O. Box 46116, Los Angeles, CA 90046
COST: $99.95

CLASSIFIED

CLASSIFIED INFORMATION

CLASSIFIED AD RATES

The classifieds are for **Pre-Owned Items & Software ONLY.** New equipment, Services, etc. must use regular Display space.

Instructions

In order for us to keep the ad rate low and insure accuracy, it is necessary that the following procedures are followed.

1. Type or print your ad legibly on a plain sheet of paper. Ads received that are difficult to read will be returned.
2. **Write the desired category at the top of each ad. Please refer to the index, this page. If a category is not indicated, ad will be placed in the Miscellaneous section.**
3. If more than one ad is submitted, use a separate piece of paper for each ad, making sure your complete name and address is at the bottom of each ad.

CLOSING DATE — 2nd Monday of the month. Example: the closing date for June's Issue is the 2nd Monday of April. **Due to our low rates, you cannot change, cancel or receive a refund on classifieds after they are typeset.** In most cases, ads are typeset within a week after they are received.

RATES — Subscribers: 17 cents per word. $3.00 per ad minimum charge. The first two words (if underlined) will be set in bold face at no additional charge. Bold face or all cap words thereafter will be thirty-four (34) cents per word. Special bold headings, partial lines, open space or leader dots are:

8 point line, $1.22 cents per line.
10 point line, $1.73 per line.
Maximum of 15 characters per line.

Non-subscriber rates are double all rates listed above.

REPEAT ADS

Ads running more than one time. A repeat ad will be coded at the end of the ad with the month ad started and issue ad ends. Example: 8-160. Ad started Aug. ends 160 issue or January. NOTE: Please check to make sure your ad has been correctly coded.

PROOFS

Due to low classified rates a free checking copy or tear sheet cannot be sent if proof of insertion is desired, please send $3.00 extra.

PHOTOS

A photo will draw attention to your ad. Photos are $7.00 per column inch. Please send in B/W photos, preferable 4x5's cropped horizontally. Include your name and address on the back of **each** photo. If photo looks like it is more than one inch send in money for two inches or more.

★ $5.00

★ ★ $4.00

★ ★ ★ $3.00

STARS

Have a special piece of equipment to sell? Reducing the price of an item and want to attract attention to that fact? Take advantage of our low price "star" attention getters.

It's a fact...unusual "artwork" in or above an ad draws attention that ad and the reader retains interest in that product longer.

GET RESPONSE QUICKER with "Stars" above your ad. Below is the rate for different sizes. Just mark "stars" and the price of the one you choose above your ad copy and we'll take care of the rest. Be sure to include the cost with your ad payment.

CS-ABBREVIATIONS

add-post .....add postage
add-post-AP ...add postage, all prices
FC .....Freight Collect
MBG .....money back guarantee
PP .....postage paid
SASE .....send self-addressed .....stamped envelope for .....check return or .....information requested
10 DRP .....10 day return privilege
CCR .....check clearance required

EXAMPLE OF STYLES:

Normal -

PDP 11/03 COMPUTER. Complete operating system with RT-11 system software plus basic. Brand new October '78. Sell complete at $7,000, or separate at: 11/03 Computer $900. Dual RX-1 disk $1,000. 32KB memory $2,800. VT-52 video $1,500. GE Terminet 30 printer $800. Intertube video terminal $400. **John Doe,** POB 1234, Somewhere, USA 00000. 123-456-7890.

10 Point Centered Head

PDP 11/03 COMPUTER

Complete **OPERATING SYSTEM** with RT-11 system software plus basic. **John Doe,** POB 1234, Somewhere, USA 00000. 123-456-7890.

Individual Listings

PDP 11/03 COMPUTER

Complete **OPERATING SYSTEM** with RT-11 system software plus basic. Brand new October '78. Sell complete at $7,000, or separate at:

11/03 Computer $900
Dual RZ-1 disc $1,000
32KB memory $2,800
Intertube video terminal $400

John Doe, POB 1234, Somewhere, USA 00000. 123-456-7890.

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CANADA Model I 48K, two drives, keypad lower case Visicalc, Scripsit, $C900 plus shipping. **519-524-7274. Ontario.** 1-61

FOUR DRIVE Model Four, with— 15" Letter Quality Printer, Green Screen, 64k, Auto-Dial Modem, software incl: CP/M, dBase, Wordstar, etc. $2000/ all or B/O on pieces. **203-777-1476.**

LOBO MAX-80 DELUXE SYSTEM for sale. Includes Max-80 w/128k RAM, twin Shugart DSDD 5" drives (1.4 megs storage!), Amdek 300A green monitor. This is the best 8-bit Z-80B system money can buy! Software includes LDOS 5.1.4, CP/M 2.2, Microsoft Basic, Microsoft Basic Compiler, Wordstar, Disc Doctor. Everything in excellent condition. Entire package $1995 or best offer or will split. Call **Murphy** at 212-929-5821. 1-61

MODEL 100 24K, cassette recorder, modem and printer cables. Several programs. Only $500. **Dave Hammaker,** Box 250, Roaring Spring, PA 16673. 814-239-2392, weekends.

MODEL 100 32K WP/SS software. Cassette unit, modem and printer I/F. **Almost new** (original pkg.) **$900** plus shipping. **Bruce Wilson,** 27 Whispering Pines, Birdsboro, PA 19508. 1-62

MODEL 100 32K with modem cable and charger. Excellent condition with service manual and free time on Compuserve. $750. **Duane Wilson,** 24715 Lawton Ave.; Loma Linda, CA 92354. 714-796-1518.

MODEL 100, 8K memory, with Bar Code Wand. $500 plus shipping. Call **Jim** at 804-971-8855. 11-60

MODEL 100, 8K memory, with Bar Code Wand. $500 plus shipping. Call **Jim** at 804-971-8855. 11-60

MODEL-1 48K, lower case mod, expansion interface with DD disk controller and RS-232 board, two disk drives, cables, manuals and loads of software, $650 or best offer. **Eugene Ayers,** 813-681-4041 after 6pm.

MODEL 16 WITH 8 MEG HARD DISK Xenix multi-user operating system included. **264K,** single floppy drive. $2750. Call **Bob Kranz,** 303-731-5635 or write **PLPOA,** 230 Port Ave., Pagosa Lakes, CO 81147.

MODEL 1 - Level II with lowercase, speed-up board, reverse video and built-in sound. Books, software, documentation, and some magazines also included. $250 plus shipping. 718-648-3254 or 212-285-6080 (on Tuesdays and Thursdays). **David Kindler,** 576 Avenue Z, Brooklyn, NY 11223.

MODEL 3K 48K 2 drives, RS232 VID80MOD CP/M2.2 TRSDOS1.3 SCRIPLUS with documentation, amber CRT. Excellent condition. $1200 firm. 602-758-2325. **Chuck Donsi,** Box 3693, Riviera, AZ 86442.

MODEL FOUR, 2 drives, 64K, Auto-Dial Modem, Epson Printer, Software, CP/M, Wordstar, etc. $1200 or B/O each piece. **203-777-1476.**

MODEL II, 128K, 15 Meg Hard Disk, Three Bay Disk Expander (2 Drive), $3500. Software avail: Profile+, G/L, Accts Pay, Payroll, Visicalc. **Doug,** 414-684-1880. 12-160

MODEL II, 128K, 15 Meg Hard Disk, Three Bay Disk Expander (2 drive). $3500. Software avail: Profile+, G/L, Accts Pay, Payroll, Visicalc. **Doug,** 414-684-1880.

MODEL II 3 bay expansion drive. Excellent. $650. **715-359-3155. 1-61**

MODEL II with 3 drives-expansion unit + LPV printer. $3000. Second Model II with 8MEG hard disk + LPV printer $4000. M-F 419-666-6554, **Mark M. or Judy.**

MODEL SIXTEEN: Two drive, Insurance Business Management, Accounting, $2500 each, add DMP-200 printer for $250. **203-777-1476.**

MOD I - Loaded; RS232, 2 drives, books, lowercase, producer, Newdos 80, Dosplus 3.5, AR, AP, GL, Scriptr, MaxiMgr, VisiCalc, Crayon Deluxe, PowerDot, SuperScripsit, approx. 300+ programs. Make offer over $800. **Flip,**

CLASSIFIED ORDER FORM

Classified Dept., COMPUTER SHOPPER
P.O. Box F, Titusville, FL 32781

To figure cost of ad, the rate is 17 cents per word, (34 cents per word bold face) $3.00 per ad minimum charge.

Run under heading # _____
See Index This Page
(Please type or print)

INCLUDE 17-CENTS PER WORD FOR YOUR NAME AND ADDRESS

Name _____

Address _____

City _____

State _____ Zip _____

INCLUDE 17-CENTS PER WORD FOR YOUR NAME AND ADDRESS

(For additional words, use separate sheet of paper)

Remittance for $_____ is enclosed.
You may run my ad _____ issues.

607-770-9009.

S-100 INTERFACE and motherboard with six slots, parallel port, serial port (0-56K baud) $225 or best offer. **Eugene Ayers,** 813-681-4041.

TANDY 2000 used only three months. 128k. Excellent condition. All manuals including compatible monitor and cable. $2300/BO. **Frank Quinn,** 27 Castle Circle, Peabody, MA 01960. 1-61

TRS-80 LEVEL II, 48K, (2) disk drives, double density, (RS232) expansion interface. Price includes numerous manuals, miscellaneous software ($100-200 orig. price), **monitor,** and **desk** custom made to inset TRS-80 and peripherals. **Someone,** please free up this space for me, no matter how low the price. Call me **collect** for 1 or all pieces. Take entire package and I'll **personally** deliver to most mid-Atlantic states. Call **Jeff,** please, **after** 11am at 919-799-9039.

TRS-80 MOD 1 48K - lower case, L PIV, 2 SS/DD drives, percom doubler. General Ledger, Accounts Payable, Portfolio, Scripsit, AIDS-plus Visicalc. 813-932-2518. **J. David Summers,** 10405 Reclinata Lane, Tampa, FL 33618. 10-60

TRS-80 MOD 1 48K - lower case, L PIV, 2 SS/DD drives, percom doubler. General Ledger, Accounts Payable, Portfolio, Scripsit, AIDS-plus Visicalc. 813-932-2518. **J. David Summers,** 10405 Reclinata Lane, Tampa, FL 33618. 10-60

TRS-80 MODEL III, 2 disc drives, 48K, RS-232C, LP-7 printer, Visicalc, Super Scripset, plus more software. All for only $1000. Call **504-447-2151.**

TRS-80 MODEL II, like new, Okidata printer, includes all software, all for $2500. Call **Bill Brown** for info: 800-238-5542 12-61

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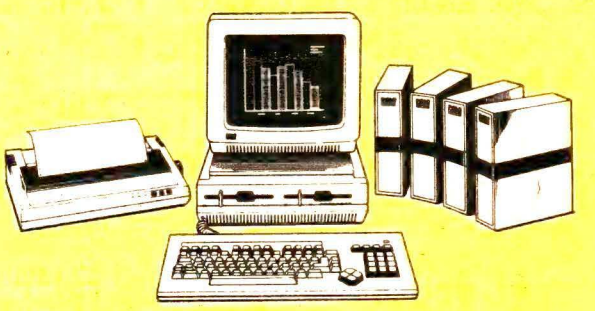

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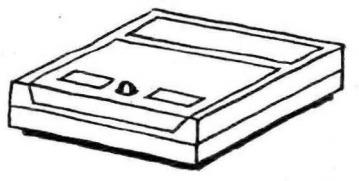

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For Apple II, Atari(all models), Commodore 64, Compaq, IBM PC, Kaypro, Osborne, Sanyo, TI99/4A, Timex-Sinclair 2068, and others. The package includes a printer, the best interface with cable and a pack of 500 smooth edge(laser perforation) 20# paper. Free shipping.

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Computer	Interface*	STAR Gemini 10x	STAR Powertype	PANASONIC KX-P1090	PANASONIC KX-P1091	PANASONIC KX-P1092	Okidata ML 92
Apple II	Grafstar	$329	$419	$299	$369	$499	$469**
Atari, TI99/4A	Axiom	$345	$435	$315	$385	$515	$475
Commodore 64	Connection*	$349	$439	$319	$389	$519	$479
IBM, Kaypro, Sanyo: Cable		$295	$385	$265	$335	$465	$425
Printing speed (CPS)/ Buffer		120/0K	18/0K	96/0K	120/1K	180/7K	160/0K
Near letter quality mode/ Graphics		no/yes	daisywheel	no/yes	yes/yes	yes/yes	yes/yes
Super- subscript/ Underlining		yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes
Italics/ Proportional spacings		yes/no	yes/yes	yes/no	yes/yes	yes/yes	yes/yes
Friction/pin-fed/adjustable sprocket		yes/yes/yes	yes/no/no	yes/yes/yes	yes/yes/yes	yes/yes/yes	yes/yes/no
Manufacture warranty(months)/ Price		6/$399	6/$499	12/$399	12/$499	12/$599	3/$499

*Interfaces for Apple are Grappler alike. They can do screen dump(graphics and text); for Apple-Ok 92 is Dumping-GX; Tymac Connection has 2K buffer. Other interfaces and additional buffer are available. Price for interfaces alone: Grafstar...$69 Axiom...$85 Tymac Connection...$89 Cable(shielded)...$35

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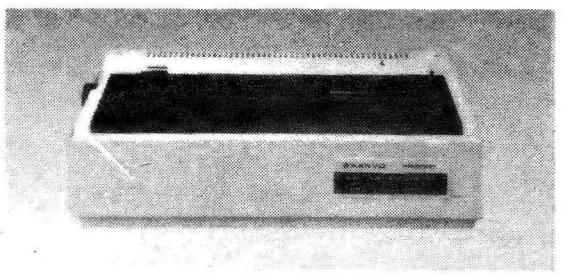

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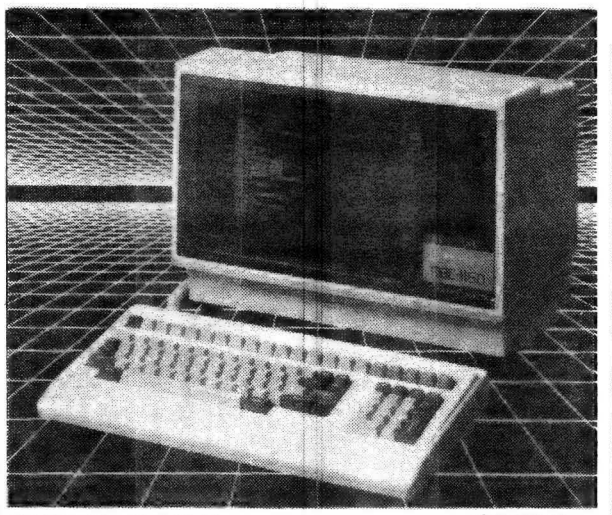

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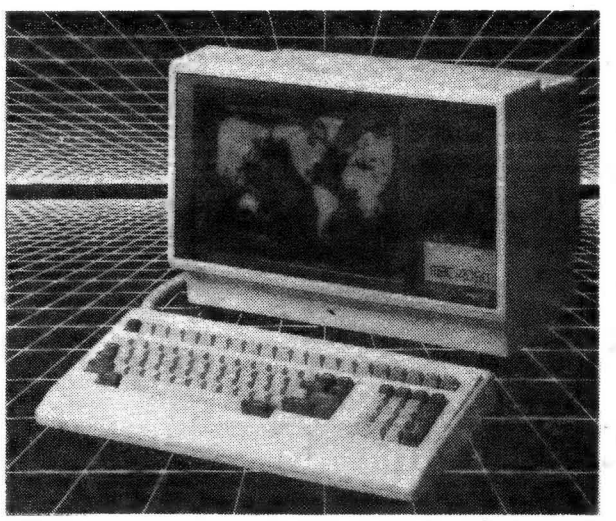

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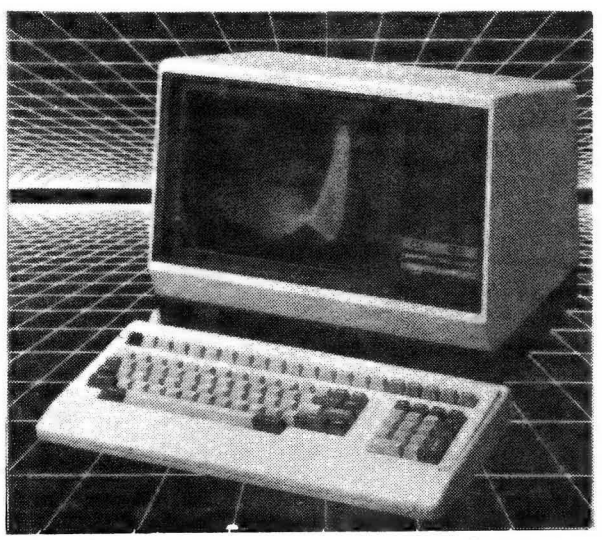

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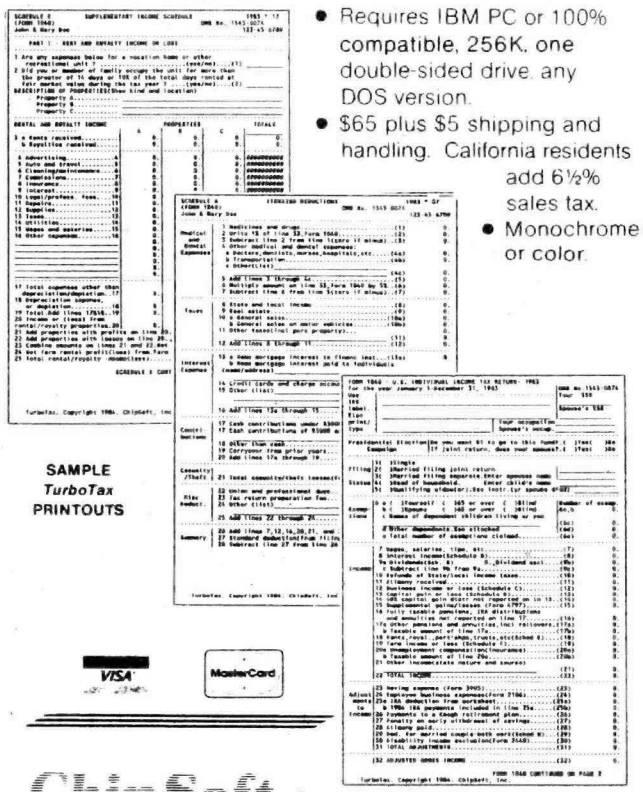

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$$$$ $700 for Apple //e Clone, 12" green monitor, DD disk drive, joystick, & software — Pinecom brand. **Godfather's Used Computer Syndicate,** P.O. Box 3037, 1154 W SR 436 Forest City, FL 32714. 305-774-1111. 1-61

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APPLE /// FOR SALE. 256K RAM, 2 disk drives, 12-inch green monitor, 120 cps dot matrix printer — all in excellent condition. Software included: AppleWriter, VisiCalc, QuickFile, Basic, Cobol, Apple // Emulation disk. $2950 or best offer. **715-834-8905, Greg Gray,** 614 Galloway, Eau Claire, WI 54703.

APPLE II + 64K, two DiskII drives, Micromodem II, Base2 printer, Romplus, prom burner, Sweet-Talker II, joystick, Calling Four, Wildcard, Koalapad, System Saver, assorted software and games. $1500. **212-738-1874.** 1-61

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APPLE III + w/256K, **APPLE** Monitor III, **APPLE** Serial III Card, RS232 cable, Hayes Smart Modem 1200, and two Microsci 578K floppy disk drives, Mint! You couldn't get a better system at this low price of only $4000. **Gary Sidoti,** One State Street, Meriden, CT 06450. 203-238-2351. 1-61

APPLE II Plus w/1 drive, monitor, CP/M, $800. **Betty,** 216-729-2808 after 2:00PM. Box 413, Gates Mill, Ohio 44040.

APPLE IIe w/1 drive & monitor, $900. **Betty,** 216-729-2808 after 2:00PM. Box 413, Gates Mills, Ohio 44040.

APPLE LISA 2/10, $4500. **Betty,** 216-729-2808, after 2:00PM. Box 413, Gates Mills, Ohio 44040.

APPLE][+ with 64k memory. $450. Good condition. No peripherals. **Dave Burger,** 10030 SW 102 Ave-Road, Miami, FL 33176. 305-595-4426.

COMPLETE PROFESSIONAL SYSTEM Apple II + compatible 64K black-beauty power supply. 2 drives, graphics tablet, MC multifunction, 2 monitors, printer, $1100 software value. Asking $1500. Games WP Visi-series. **Orin Mills,** 212-689-4780. 11-60

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BASIS 108 128K, 80-col, RGB, (The "Mercedes-Benz" of Apple compatible computers) with Z-80 & 6502 CPU's. Includes separate keyboard w/numeric keypad and two built-in drives, diagnostic controller, Applesoft in ROMS, CP/M Plus — a steal at $1195.

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Apple /// + 256K (mint), 80-col RGB, w/built-in drive, clock and numeric keypad, 12" monitor; runs Apple II software – a powerful system at a bargain price: $1395.

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MACINTOSH with Imagewriter, MacPaint and MacWrite. Best offer over $2500 (plus shipping). Call **Jim** at 804-971-8855.

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SHINY APPLES wanted. We buy, sell and trade CLEAN APPLES and peripherals. Also Commodore and IBM. **Shreve Systems,** 845 Lark Ave., Shreveport, LA 71105. 318-865-6743. 12-60

(107) APPLE COMPUTERS WANTED

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FOR APPLES - Any quantity (1-1000). Write, sending details and asking price to **Used Computer Exchange,** 4540 MacArthur Blvd. #306, Washington, DC 20007.

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(108) APPLE SOFTWARE, PERIPHERAL

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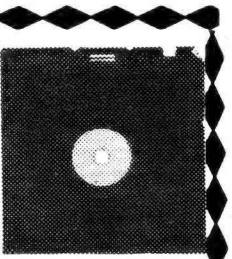

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The CPU is a Zilog's Tiny Basic Z-8 which is running at over 7.3 MHZ. This is the CPU that Steve Ciarcia has featured in many of his projects. Plug in your terminal or personal computer and program in Basic. On board RAM of 2k is included and is expandable to 4k. The unit comes equipped with a 4k ROM (2732), which contains many useful machine language routines such as and interupt driven real time clock, memory load and dump, communications port initialization and help features.

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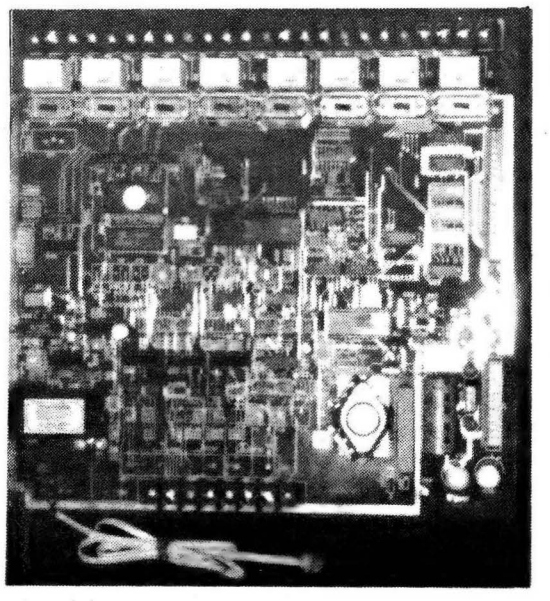

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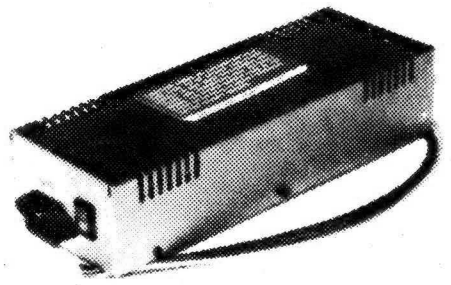

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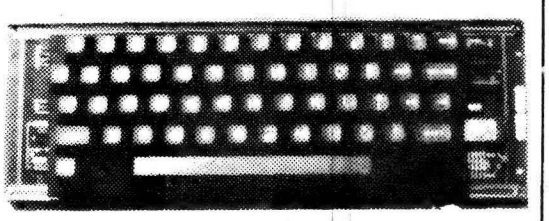

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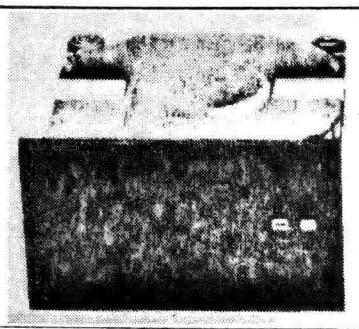

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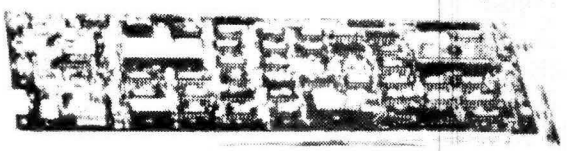

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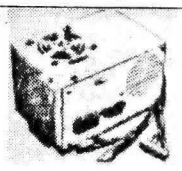

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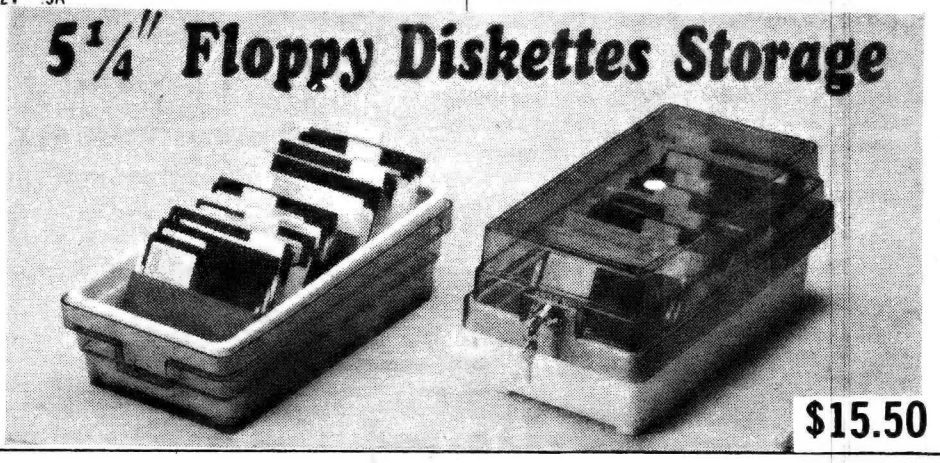

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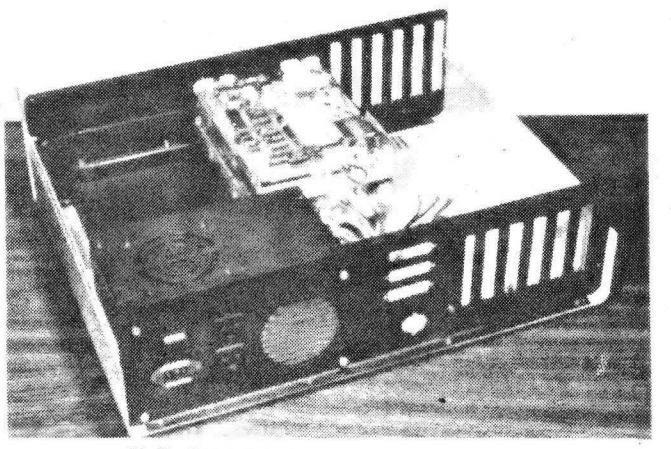

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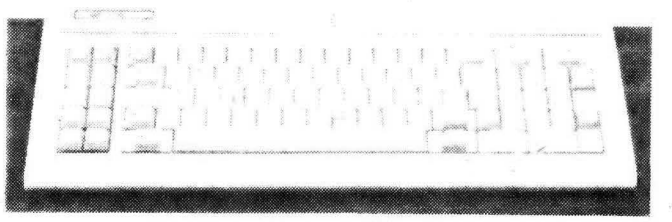

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UNIX, a three-day seminar that will include a detailed review of "C," will take place in Stamford, CT at the Hotel Stamford Plaza. For more information, call 404-359-1619

JANUARY 28-31, 1985
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JANUARY 31-FEBRUARY 2, 1985
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FEBRUARY 1985

FEBRUARY 4-6, 1985
OAC '85 to be held at the Georgia World Congress Center in Atlanta. The 1985 Conference "Today's Partnership: People & Technology" will stress state-of-the-art office solutions and the need to increase human and systems integration for increased productivity. For information, contact Helen Mugnier, AFIPS, 1899 Preston White Drive, Reston, VA 22091 or call 703-620-8926

FEBRUARY 8-10, 1985
2nd Annual Stride Faire '85 will be held at the MGM Grand Hotel/Casino in Reno, Nevada. The major focus of the show will be high-performance microcomputer software and systems. For more information contact Laura Smith, Trade Show Manager 702-322-6868

FEBRUARY 10-13, 1985
INFOMART will host a seminar titled "Personal Computers: Now in Business" at the Dallas Market Center complex in Dallas, TX. For more information, contact Marlan D. Stredwick at 214-655-6298

FEBRUARY 15-17, 1985
RAINBOWfest will be held in Irvine Marriott in Irvine, CA

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INFO/CENTRAL: The Information Management Exposition & Conference will take place at the O'Hare Exposition Center in Chicago, IL. For more information, contact INFO/CENTRAL 999 Summer St., Stamford, CT 06905 (203)964-8287

FEBRUARY 22-23, 1985
IEEE Computer Faire will be hosted by the Institute of Electrical and Electronic Engineers. The event will take place in the Exhibition Hall of the Von Braun Civic Center in Huntsville, AL. The hours are 10am-7pm on Friday and 9am-5pm on Saturday. For more information, contact Terry Mizell at 205-532-2036

MARCH 1985

MARCH 3-8, 1985
The Annual Convention and Technology Exposition will be held at the Albert Thomas Convention Center in Houston, Texas. Hosted by The American Institute for Design and Drafting, the convention marks its 25th and the technology exposition its 10th. The theme will be "Soaring To New Heights." For more information, write to AIDD National Headquarters, 901 N. Washington Street, Suite 509, Alexandria, VA 22314

MARCH 11-14, 1985
The Computer Science Conference will be held in the Marriott Hotel in New Orleans, LA. The conference is sponsored by the Association for Computing Machinery and the Computer Science Departments of many universities. For more information, write to Computer Science Employment Register, Department of Computer Science, University of Pittsburgh, P.O. Box 13526, Pittsburgh, PA 15234.

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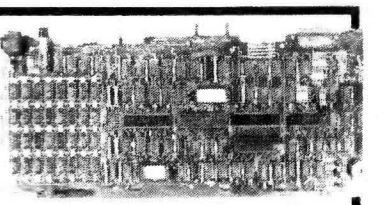

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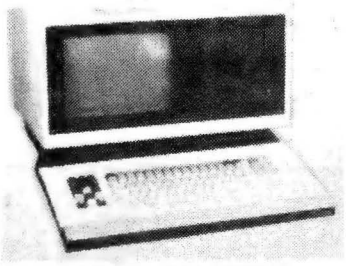

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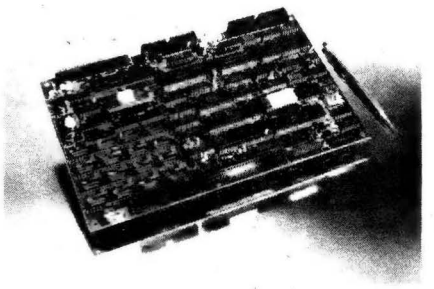

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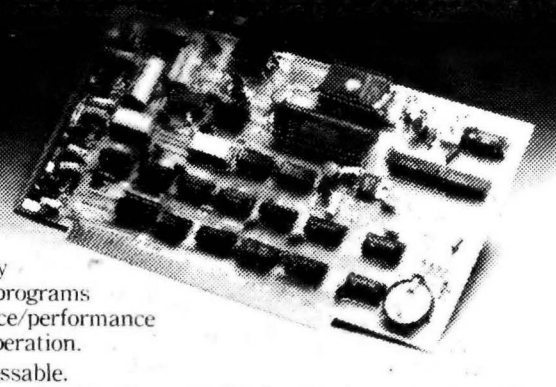

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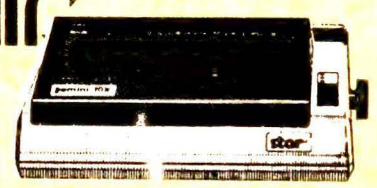

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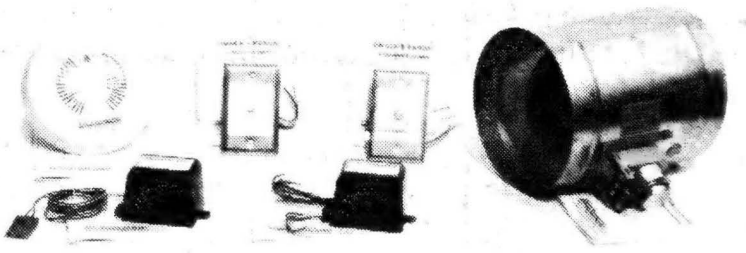

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Each setup includes two half height double sided disk drives and all hardware and connectors required to mount inside your H-89. Also included is a steel mounting shield/case. This shield/case is required for the 96 TPI drives but may be deleted (deduct $30.00) for the 48 TPI Setups. If this case is deleted you must drill four mounting holes in your existing mounting hardware.

NATIONAL JA551-2 SETUP, 48 TPI, 6MS seek, 640K total **$392.00**

MITSUBISHI 4851 Setup, 48 TPI, 6 MS seek, 640K total **$454.00**

MITSUBISHI 4853 Setup, 96 TPI, 3 MS seek, 1280K total **$494.00**

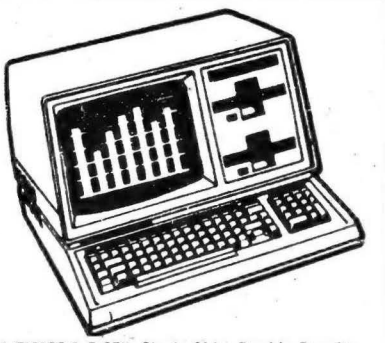
WINCHESTER HARD DISK SYSTEMS

We can now supply complete hard disk systems for Zenith computers or separate components. Please write or call for the very best systems at low Payload prices.

DISK DRIVES

The very best drives at PAYLOAD prices. We highly recommend the Half Height Drives for value, performance and reliability.

TANDON TM848-2 8", Thinline, DS, DD, 48 TPI **$396.00**



TANDON TM100-1 5.25", Single Side, Double Density, 48 TPI **$194.00**

TANDON TM100-2 5.25", Double Side, Double Density, 48 TPI **$219.00**

TANDON TM101-4 5.25", Double Side, Double Density, 96 TPI **$295.00**

NATIONAL JA551-2 5.25", Half Height, DS, DD, 48 TPI **$174.00**

MITSUBISHI M4851 5.25", Half Height, DS, DD, 48 TPI **$210.00**

MITSUBISHI M4853 5.25", Half Height, DS, DD, 96 TPI **$225.00**

POWER SUPPLIES AND CASES FOR DISK DRIVES

For standard and half height disk drives. Rugged steel construction with heavy duty power supplies. Purchase with drives and we will configure and install in case for you.

Single 5.25" unit for standard drive **$68.00**

Dual 5.25" unit, specify Standard or Half Height **$92.00**

Dual 8" unit with fan, for thinline drives . . . **$225.00**

Face plate for single drive in dual case **$8.00**

For WINCHESTER Drive, 5.25" **$225.00**

C. ITOH DOT MATRIX PRINTERS

GORILLA BANANA. Reliable companion for most computers. Serial or parallel interface. Retail $199.00. Payload price **$169.50**

PROWRITER 8510-AP. 10" inch carriage, 120 CPS, Correspondence quality matrix. Tractor and Friction feed. Parallel interface. **$366.00**

PROWRITER 8510-BCD. Same as above but Serial interface. **$467.00**

PROWRITER/2 Model 1550P. Same as 8510-AP but 15" carriage. **$569.00**

PROWRITER/2 Model 1550BCD. Same as above but Serial interface. **$652.00**

C. ITOH HOT DOT 8510-SP 10" Carriage, 180 CPS, Tractor and Friction, Parallel **$492.00**

C. ITOH HOT DOT 8510-SR 10" Carriage, 180 CPS, Tractor and Friction, Serial **$541.00**

C. ITOH HOT DOT 1550-SP 15" Carriage, 180 CPS. Tractor and Friction, Parallel **$688.00**

C. ITOH HOT DOT 1550-SR 15" Carriage, 180 CPS, Tractor and Friction, Serial **$731.00**

C. ITOH LETTER QUALITY PRINTERS

STARWRITER A10-20 Daisy Wheel, 18 CPS. Fifteen inch carriage. Order Parallel or Serial interface. Retail price $795.00, PAYLOAD Price only **$555.00**

STARWRITER F10-40 Daisy Wheel, 40 CPS. Fifteen inch carriage. Order Parallel or Serial interface. Retail price $1795, PAYLOAD Price only **$1055.00**

PRINTMASTER F10-55 Same as STARWRITER except faster print speed, 55 CPS. Order Parallel or Serial interface. Retail price $1995.00, PAYLOAD **$1263.00**

PAYLOAD COMPUTER SERVICES

Your satisfaction is guaranteed. All hardware carries a 90 day warranty. Prices listed have been discounted for payment with order. VISA and MASTERCARD orders please add 3%. Add $5.00 to all orders for handling and shipping, we pay the balance. Call us, we will be happy to answer your questions. THANK YOU.

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PHONE (713) 486-0687

operating systems. Will trade high quality business and personal software. Send your list along with your needs to **Neal,** 20295 Anita Ave. #6, Castro Valley, California 94546.

(133) BURROUGHS SYSTEMS

★ ★ ★

BURROUGHS B-80 MINI-COMPUTER Burroughs maintained. Two 1-MEG Floppy Drives, Screen, and Printer built in. Call 813-383-5595, 9AM - 5PM. Sacrifice. Make offer. **Tides,** P.O. Box 606, Longboat Key, Florida 33548. 1-62

(134) HEWLETT PACKARD COMPUTERS FOR SALE

H/P 21MX System: 2108 CPU with 32kw, DCPC, mem. protect, floating point. 7900 disk drive, 2640 CRT, 2767 line printer, H/P 64" rack. Extra disk cartridges included. System will run DOS or RTE-II software. $2750. Call **Ken** after 6pm EST **201-584-7604.** **12-60**

$$$$ HP-86B 256K, 2 ea. 3.5' drives #9121, 12' Green Monitor #82913A, HP-82906A 80 Col. Printer, Fortran, Pascal, Word 80, File 80 Visicalc +, USCD P-System Compiler & Utilities. $3000 with warranty. **Godfather's Used Computer Syndicate,** P.O. Box 3037, 1154 W. SR 436, Forest City, FL 32714. 305-774-1111. 1-61

HP-87 320K Ram CP/M 82901M Dual Drive Modem I/O-Rom AP-Rom Mat-Rom p-System Pascal Fortran Word-80 File-80 82905A Printer Wordstar Forth Visicalc. $3200. Phone 301-262-9325. **Morton Rau,** 4095 Mt. Atlas Ln., Haymarket, VA 22069.

HP-87A COMPUTER, $1100. 82909A 128K Memory, $300. 82907A 32K Memory, $125. 82940A GP-IO Interface, $275. 82950A Modem, $200. 82900A CP/M System, $250. 87 VisiCalc, $95. 87 WordStar $200. 82903A 16K Memory $75. **Bob Thomason,** 502-683-9871. 12-61

(134A) HEWLETT PACKARD COMPUTERS WANTED

$$$$ I Buy, Sell, & Trade Hewlett Packard computers. **Godfather's Used Computer Syndicate,** P.O. Box 3037, 1154 W. SR 436, Forest City, FL 32714. 305-774-1111. 1-61

$$$$ I Buy, Sell, & Trade IBM PC's. **Godfather's Used Computer Syndicate,** P.O. Box 3037, 1154 W. SR 436, Forest City, FL 32714. 305-774-1111. 1-61

(134B) HEWLETT PACKARD SOFTWARE, PERIPH.

COMPUTER AIDED stock market analyzer for HP 86 or 87 computer. Unique programs for buying or selling stocks and commodities. Make large profits in both markets. Send one dollar plus SASE (40¢) to **Lock Software,** Box 3163, Baltimore, MD 21228. 12-64

DISC DRIVE: 15MB 9133XV Winchester with 3½" microfloppy. For HP150, HP110, Series 200, 9845. Excellent. $2200. **716-425-2497.**

HP-41 ACCESSORIES, HP-IL 82161A Digital Cassette Drive with three cassette tapes $275, HP-IL 82163A Video Interface $120, Time Module $30, Extended Functions/Memory Module $30, HP 82153A Optical Wand $70, call 513-426-6754 after 5PM EST. **Larry D. Hutchison,** 2216 Mohave Dr., Beavercreek, Ohio 45431. 1-61

HP98134A INTERFACE wanted, also 9815S Computers. 818-767-8809. **D.I.L.,** 11800 Sheldon St., Sun Valley, CA 91352.

PERIPHERALS WANTED for HP-86. ROMS, Interfaces, Software, etc. **Richard Groshong,** 6604 Kent Drive, Cedar Rapids, IA 52406. 12-61

(136) DATA GENERAL SYSTEMS

(138) DATA GENERAL SOFTWARE, PERIPH.

(142) DATAPOINT SYSTEMS

FOR SALE: Datapoint 1500, (2) 8" disk drives, letter quality printer, will sell cheap. Phone **205-459-2835. Nights 205-459-2630. Darryl Jackson.** 1-63

(144) DATAPOINT SOFTWARE, PERIPH.

(148) DEC SYSTEMS FOR SALE

★ ★ ★

DEC PDP11/03, excellent condition with VT-100 Terminal, RX01 Dual 8" Disk Drive, and DECwriter IV high speed terminal/printer. A system that is expandable to 16 terminals for $4000!!! **William Ray,** 125 Simpson St. NW, Atlanta, GA 30313. 404-223-0108. 12-60

DEC PRO350; 5MB Disk; POS2.0; CPM, IBM MS-DOS Boards, Super Micro $7500. 312-742-5117. **Robert Johnston,** Box 33, Elgin, IL 60121. 10-60

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DEC PRO 350

Several systems (still under warranty) for sale. Best offer. Each includes 512 KB RAM, floating point adapter, Monitor, Dual Floppys, 10 meg Hard Disk, LA100 PC Printer (240 CPS, 132 char. carriage) and PRO Operating System V2.0. **BACDATA Medical Information Systems, Inc.,** 100 Campus Road, Totowa, New Jersey 07512. 201-890-1155. 11-60

MINT DECMATE II computer, DEC LA-50 printer, 10MB Winchester hard disk. 30% off list. Phone 603-542-9637 evenings. Write P.O. Box 792,, Claremont, NH 03743.1-61

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MISCELLANEOUS HARDWARE: PDP 11/45FL, 16K mem, PDP 11/34 chassis, 2-LA36's, LA 38, DZ-11B, CR-11A, 4-DR11B's, 2-RL01's, 960 cab, 9602 cab, 967 cab, an 18 channel Gould stripchart recorder, and a visicorder. Phone: **813-377-3908.**

PDP 11/23 For Sale: DEC KDF-AA 11/23 CPU board with memory management $450. Will consider trades. **Garv Sanders.** 614-457-4595.

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PDP 11/23 SYSTEM

Complete system includes 1024 Kb memory, 17 terminal ports, 4 printer ports (1 parallel, 3 serial), 90 Mb CDC CMD drive with 15 Mb Phoenix cartridge, backup power supply, RT-11, 16K RAM disk. $8000. Extra Phoenix cartridges available. **Kevin Dingle,** 313-852-6010.

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PDP 11/34A SYSTEM, LP05, DZ-11, LA36, 2-RK07's, 3-VT100's, 2-DL-11's. **PDP** 11/34 **A System,** RK05, 2-RX01's, 28K, DZ-11. Phone: **813-377-3908.**

PDP8-A CPU, two dual disk drives, two VT52 terminals, WPS8 software. Excellent condition. Best offer under $3000. 305-485-0795. **Dana K. Cassell,** P.O. Box 9844, Ft. Lauderdale, FL 33310.

RAINBOW 100B system including 516K memory, CPM 86/80, MS-DOS, lots of software, LA-50 printer. 3 months old. $3000. **Paul,** 215-474-9356 eves.

RELOCATION SALE - Cash or certified payment. Pro-350 CPU-11/23, 512 KB, FP option, 10 MB disk dual 96 TPI floppy, software Pos v1.7 (RSX), Basic, Fortran, toolkit, WP-11 & prose, Comm v1.8 and Kermit. Cost is well over 10,000 +, asking $4500. DEC 11/34A printer $350. **W. Chin,** P.O. Box 2085, Clifton, NJ 07015 or call 201-470-8836. 1-61

(149) DEC SYSTEMS WANTED

$ CASH PAID $

CASH PAID for DEC systems - Rainbows, Pro's, etc. Any quantity. **202-337-USED.**

PDP-8 E/M MANUALS, Cards, System components, Disc drive, software, interfaces. **Richard Groshong,** 6604 Kent Drive, Cedar Rapids, IA 52406. 12-61

PDP8 EQUIPMENT wanted. Help, home computer hobbyist needs assistance in locating reasonably priced used PDP8 hardware, software, and documentation. In-

SERVICE DIRECTORY

Classified listing of services, publications, consultants and business opportunities. Listing by subject. Vendor classification not available. Standard classified rates and policies apply.

ELECTRONIC PACKAGING DESIGN Printed circuit boards, cables, and wiring, enclosures, documentation, assembly, prototypes. Send for information. **Aerotronix, Dept. CS, 45961 Private Shore Dr., Mt. Clemens, MI 48045.** **11-60**

MONEY & VALUE calculator; FAST, FLEXIBLE financial analysis. Manual with over 60 examples. All functions in one program beat table lookup; includes tax adjustments, annuity growth, discount rate. Limited time introductory offer, $39.95 plus P&H (and NYS tax); send SASE for more information. **MV Software #1,** P.O. Box 35, Troy, NY 12181. 8-60

THE CHICAGO GREENE MACHINE is Chicago's largest & oldest on-line dating service. Ladies can join for FREE. Call **312-622-4442 anytime.** **8-60**

CHRISTIAN COMPUTER CLUB. Monthly newsletter, reviews, programs, free ads and more. For details and free issue of E3C Electletter, write: **Elect Christian Computer Club,** Dept. SE1, P.O. Box 31022, Chicago, IL 60631-0022.12-65

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PRINTED CIRCUIT ARTWORK. If you're tired of doing PC artwork, send me your circuit and I'll provide hi-quality single/double-sided artwork master/s or even negatives! Personal, professional service, excellent results, reasonable prices. For free information call: **Peter A. Sarro,** 212-928-9419, 10am - 5pm. 12-64

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SAVE $$$$ for software and supplies! Join our buying service! Pay only 10% over our cost plus shipping (MI residents add 4% tax). Only $35/year. Join now! We cover Commodore, Apple, Atari, IBM, and most others. Bonus for recruiting members! **Micro Connection,** Box 457, Dept. CS, Lakeview, MI 48850. 12-60

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DISK COPY protection, any scheme whatsoever is defeatable with a new method. **M. Sereda,** PO Box 489, Alburg, VT 05440.

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SAVE $$$$ for software and supplies! Join our buying service! Pay only 10% over our cost plus shipping (MI residents add 4% tax). Only $35/year. Join now! We cover Commodore, Apple, Atari, IBM, and most others. Bonus for recruiting members! **Micro Connection,** Box 457, Dept. CS, Lakeview, MI 48850. 12-60

HIGH PERFORMANCE VIDEO MONITOR

BALL BCX-200 HP Monitor

12", P31 Green, Non Composite, Separate Sync, 27 MHz Video Bandwidth.

- Vertical Sync: 47-82 Hz
- Horizontal Sync (Jumper Selectable): 14.75 kHz to 25.00 kHz
- Power Requirements: 12 VDC @ 1.5 AMP
- **PERFECT FOR BIG BOARD II WHEN USING 9×11 CHARACTER SET**

NEW with schematic shipping weight 10 lbs

MONITOR ONLY $62.50

PLASTIC ENCLOSURE

Pictured above. Size 17×14×12". Room for mounting monitor, power supply, & S.B.C.

- **PERFECT FIT FOR XEROX 820-1 BOARD! NEW, SHIPPING WEIGHT 12 LBS**

ENCLOSURE ONLY $40.00

KEYBOARD & ENCLOSURE

80-key X-Y scanned microprocessor controlled ASC II encoder kit. *ROM source code supplied* so user can change codes. Size 17×8.5×3". New, with schematics, weight 8 lbs

KEYBOARD, ENCODER KIT AND ENCLOSURE $60.00

Regulated power supply, 6 outputs: 5v @ 4 A, +/– 12 v @ 0.2 A, +24v @ 1.2 A, –24v @ 0.2A, +15v @ 2.6 A. 14×4×3", 10 lbs. New. **REGULATED POWER SUPPLY.....$35.00**

ARKON ENGINEERING
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(305) 676-5153 evenings

TERMS: Prepaid or UPS COD (CASH OR CERTIFIED CHECKS ONLY)

DEC COMPATIBLE DISK SYSTEMS

Complete DEC RX02 compatible floppy disk systems with Micro Technology MXV22, 22 bit Q-Bus controller:

(1) 8" SS/DD drive (Siemens FDD100-8)	$1500
(1) 8" DS/DD drive (Siemens FDD200-8)	$1600
(2) 8" SS/DD slim line drives (Tandon 848-1)	$2200
(2) 8" DS/DD slim line drives (Tandon 848-2)	$2400

Floppy disk systems carry a 90 day warranty.

DEC RL01/RL02 or RK06/RK07 compatible system using 5¼" Winchester disk with MTI or Dilog Q-bus controller:

10 mega-byte = 2 RL01 or 1 RL02	$2700
15 mega-byte = 3 RL01	$2900
20 mega-byte = 4 RL01 or 2 RL02	$3100
40 mega-byte = 4 RL02	$3900
14 mega-byte = 1 RK06	$3300
42 mega-byte = 3 RK06	$4500
56 mega-byte = 4 RK06 or 2 RK07	$5500
84 mega-byte = 6 RK06 or 3 RK07	$6500
112 mega-byte = 8 RK06 or 4 RK07	$7500

Winchester systems carry a 6 mo. warranty. Rackmount enclosure by Sigma for two Winchester drives or Winchester drive and floppy drive, add $250 to above system prices. Call for details on other 5¼" floppy or Winchester disk systems.

Micro Technology, Inc. controllers used in the above systems ribbon cables included upon request:

MTI MXV22 Floppy disk controller (RX02 compatible, 22 bit addressing) ..$750
MTI MLV11M Winchester controller (RL01 or RL02 compatible 5¼" Winchester) $1250

Controllers carry a 1 yr. warranty from MTI

The 11 Connexion offers its desktop enclosures for 8" and 5¼" disk systems. These enclosures are made of .090 anodized aluminum painted with a tough commercial epoxy paint. The base is light gray with black trim and lettering and the top is egg shell white. Cabinets for 8" systems are 9"H x 11"W x 15"D and will hold a single full size 8" floppy or Winchester drive or two slim line floppy drives with room for many of the single board computers available today. The 5¼" cabinet is 6½"H x 7"W x 11"D and will hold a single full size 5¼" floppy or Winchester or two half wide drives.

Either cabinet w/feet, power switch, fasteners	$60
Cabinet, as above w/fan, EMI filter, power cord	$95
Cabinet (8") as above, w/Condor P.S. for single drive	$250
Cabinet (8") as above, w/Condor P.S. for dual drive	$275
Cabinet (5¼") as above w/P.S. for Winchester drive	$275

THE 11 CONNEXION
1815 Peterson Lane, Santa Rosa, CA 95401. (707) 545-7778

terested in PDP8/E or PDP8/A cpu's, power supplies, interfaces, peripherals, memory, cables and documentation. Need an operating system on RX01 8" floppy. (Or any medium). **Jim,** 469 Jayson Ave., Pittsburgh, PA 15228. 1-62

(150) DEC SOFTWARE, PERIPHERAL

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DEC 256K Memory boards, **DEC** Model 5752, works on PDP-11, standard Unibus configuration. 16K word x 16 bit MOS Memory (Mostek 4027N parts!). Great for DEC fans or innovative hobbyists. Were around $1800 new. Never used. $75 each or Good Deal on 10 or more. **Gary Sidoti,** One State Street, Meriden, CT 06450. 203-238-2351. 1-61

DEC LA50 Printer, mint, in unopened box. $490 includes shipping. **716-461-5407.**

DEC MS DOS $60

DEC MS DOS version 2.02. Mint in boxes, $60. **202-337-1303.**

DEC PERIPHERALS 40%—60% OFF

Color monitors, 10 meg hard disks, diskettes, graphics cards, printers, system units (no monitor or keyboard). **202-337-1303.**

(154) IBM SYSTEMS FOR SALE

FOR SALE BY OWNER:
IBM SYSTEM 134-F37
with communication and expansion board for 16 devices.
IBM MAINTENANCE.
$26,950 or best offer.
Call Miami 305-635-2445. 12-60

IBM SYSTEM 3, 5410 CPU, 5424 multifunction card reader, 5444 disc storage drive, 5445 main drive. 5203 printer, 5496 keyboard, 1731 carbon deleaver, 330 Moore Speeditacher, Model 1 digital ISC terminal adapter, JMB storage disks, operating disks, instructions, etc. You move. $3000 OBO any part. No collect calls. **M. Borofsky,** 50 Pleasant, Claremont, NH 03743. 603-543-0082. 1-62

IBM SYSTEM/3. Complete system with 300**LPM** printer, (2) disk drives, console, **MFCM.** Also (2) data recorders, **TAB** burster, decollator, (320) boxes cards, (18) boxes 2-part paper, approx. (25) disk packs, other misc supplies. Will go to **best bid/s** received within 60 days from date of this paper on all/any part. **SASE** to **Computer List** for list or send **BIDS** to POB 1516, Hemphill, TX 75948.

(155) IBM SYSTEMS WANTED

IBM 5100 models B1-C4 with 5106, 5103. Working condition. **415-355-2075.** 4-62

IBM DISPLAYWRITER interface for a non-IBM serial or parallel interface printer to be connected (not a standard IBM product). 412-523-6095. **Nils H. Ljungman,** P.O. Box 130, Greensburg, PA 15601.

$$$$ I Buy, Sell, & Trade IBM PC's. **Godfather's Used Computer Syndicate,** P.O. Box 3037, 1154 W. SR 436, Forest City, FL 32714. 305-774-1111. 1-61

(156) IBM SOFTWARE, PERIPHERAL

175 WATT SWITCHER
Improved Japanese version of the Boschert OL-153. 5V/15A, + 12V/4A, 24V/4A: 175W, max. This is an extremely small, lightweight power source with LOTS of punch! Perfect for the every-slot-filled PC or PC clone. Run on 115/230 and are factory new. KEC model SCB174-01, $79. **Computer Parts Mart,** 415-493-5930.

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FOR IBM AFICIONADOS

MONTE CARLO BARE BOARD 256K with parity, serial and parallel ports, game port and calendar time clock. Board and manual $39. **Computer Parts Mart,** 3200 Park Blvd., Palo Alto, CA 94306. 415-493-5930.

GENERATIONS, the **GENEALOGY** Program for IBM PC. Organized by and for Genealogists worldwide. Ancestrial tracing; statistical data bank. Video and printer outputs. Nationally advertised for $39.95 -- CLIP OUT THIS AD; enclose $29.95 to **MICRO-80 INC.,** 2665-CS Busby Road, Oak Harbor, WA 98277.10-62

$$$$ I have like new, warranted double sided, 80 track, 96 TPI, half-height Teac 55F 5' drives with 811K storage for your IBM PC's for $135 each, delivered. We have programs that will enable your PC or XT to use these drives with DOS 2.0. Back up your hard disk with 12 floppies!! — $60. **Godfather's Used Computer Syndicate,** P.O. Box 3037, 1154 W. SR 436, Forest City, FL 32714. 305-774-1111. 1-61

OTHELLO PROGRAM $7. Fun for all and easy to use. Add $1 s/h. Requires color/graphics adapter. CA residents add tax. **James Oh & Associates,** P.O. Box 51007, Pacific Grove, CA 93950. 1-62

POWER SUPPLY 130W, $205. **PCSERV,** Box 524, CML, CA 95009. 408-559-1568. Visa or M/C. 11-62

PROPERTY MANAGEMENT DATABASE. dBASE-II code, interactive, menu-driven, easy to use, extensive error checking, 15 reports including past-due tenants, vacancies, cash receipts, rent worksheets, statements, General Ledger w/checkwriter. Fully tested $595. **Rodney Hendrix, Realty Systems,** P.O. Box 16, Selmer, TN 38375.

PUBLIC DOMAIN IBMPC $7 side/vol. Librarys: PCBLUE, CP/M86. For-MATS: PC, IBM86, Columbia86. SASe. VISA/MC. **Cramer,** Box 28606CS, Columbus, OH 43228-0606. 1-61

SEEQUA and **IBM-PC** repairs, upgrades, periph., and software. All models and O/S. 606-745-4013. **D.F.S. Systems,** 116 S. Highland St., Winchester, KY 40391. 1-61

(160) NCR SYSTEMS

(162) NCR, SOFTWARE, PERIPHERAL

(166) MISC. (HARDWARE & SOFTWARE)

BMC 12" GREEN SCREEN MONITOR. $50 plus $5 shipping. Call **Ed Schneider,** 28 Orchid Road, Levittown, NY 11756. 516-796-8825.

GEN-PAK JR. CP/M Accounting System. $69. Specify format. **Corp. Data Services,** P.O. Box 13936, Tampa, FL. 813-831-5550.

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MIDWEST SCIENTIFIC INSTRUMENTS COMPUTER. MSI System 12 computer system with CRT terminal, Centronics printer, dual floppy disk drive system, and 10 megabyte fixed/removable hard disk system. System includes SDOS operating system software, systems utilities, and MSI business system software. System is in good working order. $3500. Or separate as follows: 1) Hazeltine 1500 CRT terminal, excellent condition, $250. 2) Caelus 10 megabyte hard disk drive, front loading 5 megabyte removable cartridge, and 5 megabyte fixed platter. In good working order, minimum usage. $1000. 3) Two Centronics 702 printers, excellent condition and in good working order. $400 each. 4) MSI FD-8 dual floppy disk drive system, compatible with MSI 6800 computer systems, good working order. $500. 5) Computer systems metal desk, 36" x 72" x 80", with equipment bay. $300. Best offers considered. **Paul R. Johnson,** 1505 Harold, Olathe, KS 66061.

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MIDWEST SCIENTIFIC INSTRUMENTS COMPUTER. MSI System 12 computer system with CRT terminal, Centronics printer, dual floppy disk drive system, and 10 megabyte fixed/removable hard disk system. System includes SDOS operating system software, systems utilities, and MSI business system software. System is in good working order. $3500. Or separate as follows: 1) Hazeltine 1500 CRT terminal, excellent condition, $250. 2) Caelus 10 megabyte hard disk drive, front loading 5 megabyte removable cartridge, and 5 megabyte fixed platter. In good working order, minimum usage. $1000. 3) Two Centronics 702 printers, excellent condition and in good working order. $400 each. 4) MSI FD-8 dual floppy disk drive system, compatible with MSI 6800 computer systems, good working order. $500. 5) Computer system metal desk, 36"x72"x80", with equipment bay. $300. Best offers considered. **Paul R. Johnson,** 1505 Harold, Olathe, KS 66061.

PUBLIC DOMAIN 5" $5SS/ $6DS/ $8flpy. Librarys: CPMUG, SIGM, Piconet, IBMPC, Osborne, Zorba, CPM86. Sect-191 SoftFRMTS. SASE. VISA/MC. **Cramer,** Box 28606CS, Columbus, OH 43228-0606. 1-61

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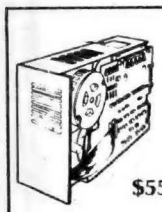

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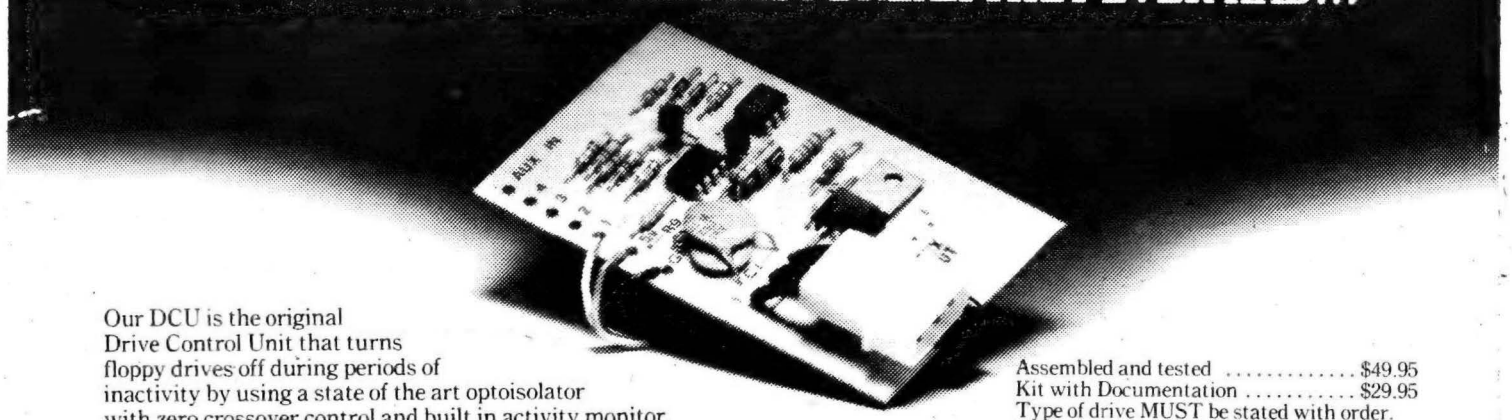

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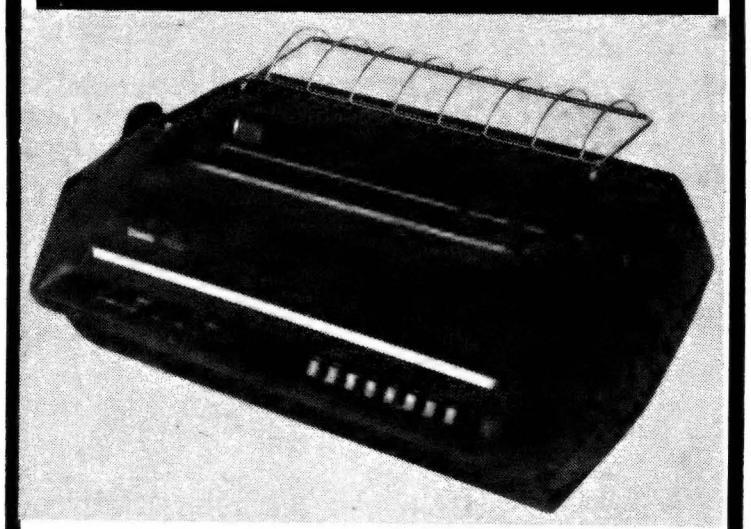

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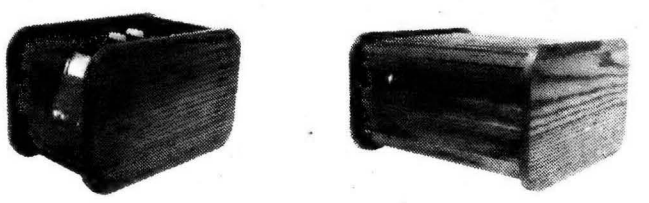

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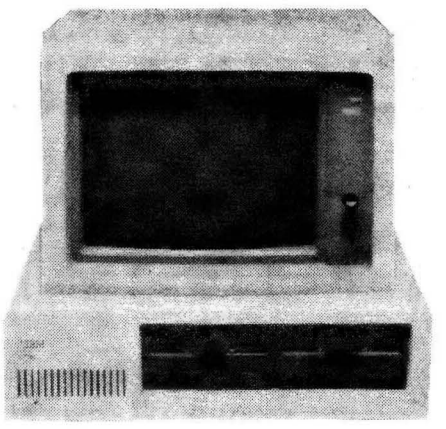

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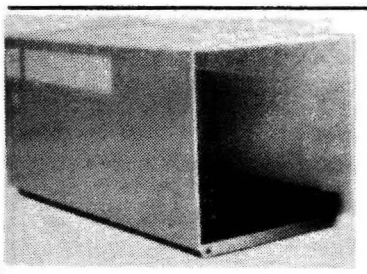

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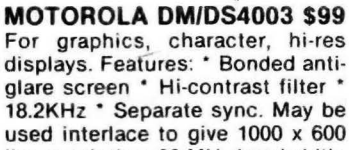

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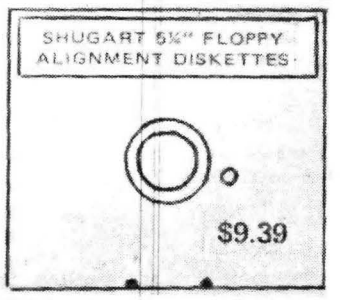

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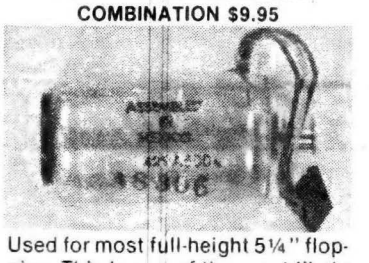

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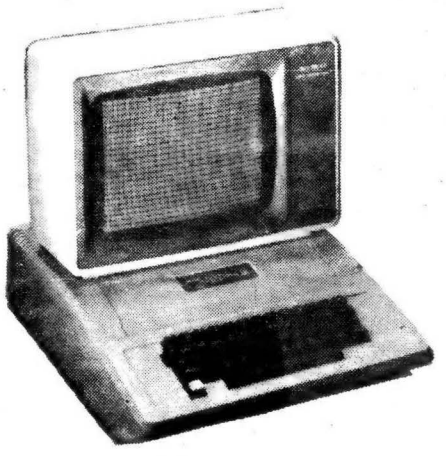

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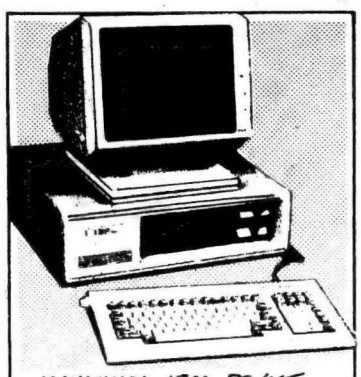

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Directory of Software

Index to Software Categories and Abbreviations

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• CODE

CAI	Computer Aided Instr.
GRA	Graphics
HOM	Home Economics
PER	Personal + Recreation

PROGRAMMING
• CODE

ASM	Assembler
BAS	BASIC Language
COB	Cobol Language
CST	Cassette Program
DBM	Data Base Manager
EDT	Editor
FOR	FORTRAN Language
FTH	Forth Language
LNG	Other Languages
O/S	Operating System
PAS	Pascal Language
RPT	Report Writer
SOU	Sound Prog./Device
TEL	Telecommunications
UTL	UTILITY/OTHER
CAT	EXTENSIVE CATALOG
OTH	OTHER PROGRAMS AND SOFTWARE
CUS	CUSTOMIZED S/WARE

BUSINESS
• CODE

ANA	Business Analysis
A/P	Accounts Payable
A/R	Accounts Receivable
BUS	General Bus./Other
CAS	Cash Register
G/L	General Ledger
INV	Inventory
JOB	Job Costing
MAI	Mailing List
OMG	Osborne/McGraw-Hill Business Pkg.
PKG	Complete Package
PAY	Payroll
TAX	Tax Packages
W/P	Word Processing

INDUSTRIAL
• CODE

BWL	Bowling League Sec.
CPA	Cert. Public Accounting
DEN	Dental
ENG	Engineering
FIN	Financial
INS	Insurance
LAW	Legal
MED	Medical
PTR	Prof. Time Reporter
REA	Real Estate
SAL	Sales Analysis
STA	Statistics
SXC	Stock Exchange

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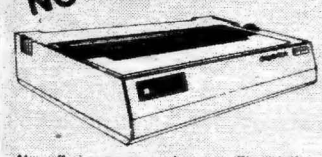

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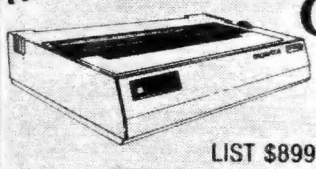

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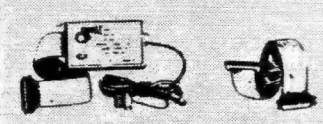

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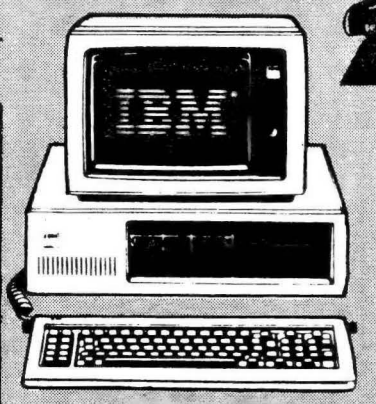

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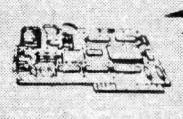

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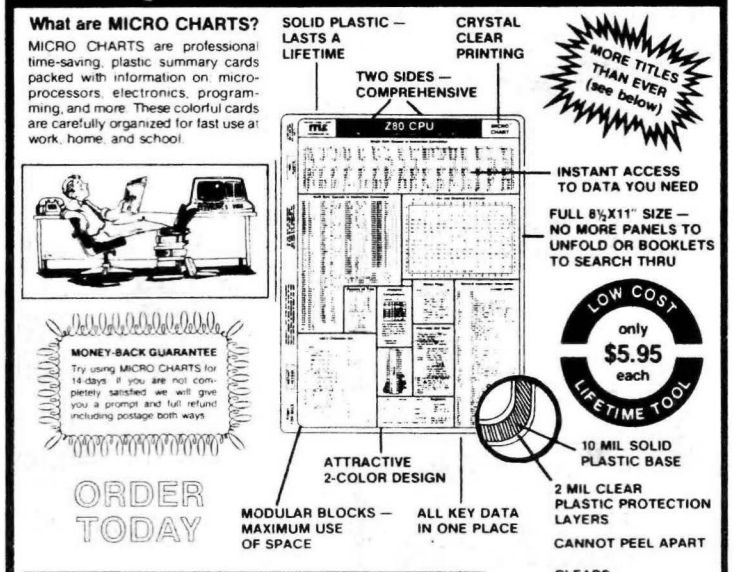

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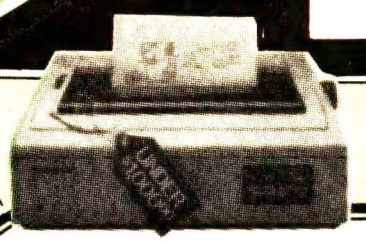

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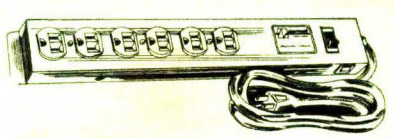

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1. Model# 5SVA&T - Designed to house one full size or 2 half height 5¼" floppy disk drives in the vertical position. As an added feature, the mounting holes are duplicated in reverse so the user can mount the drives door left or door right. The power supply is a custom linear, proven in thousands of installations over the years!

Retail.....$60.00, ($67.00 for half hgt version)
1 year warranty

2. Model# 5DVA&T - The 5DV is custom designed for 2 full size 5¼" floppy disk drives to mount vertically. The mounting holes are duplicated in reverse so the drives may be mounted door left or right. The power supply is our custom linear.

Retail.....$85.00 1 year warranty

3. Model#FD-PC8 - This unique enclosure is designed to match the styling and size of the IBM-PC and can mount on top of, under or along side the PC. It is designed to house Shugart 8 inch half height floppy disk drives, and affords mainframe compatibility using 8 inch floppy diskettes.

Retail.....$399.00 1 year warranty

4. Model #DH8A&T-the DH8 is designed for one or two standard size 8 inch disk drives such as Shugart 800 series. Qume DT-8, and SIEMENS. The power supply is 206 series commercial grade with a two year warranty! Cooling fan standard. There is space designed above the disk drive area for mounting circuit boards if needed. Specify double or single sided connectors.

Retail.....$295.00 2 year warranty

5. Model# FD-PC-jr. - For those needing expansion of their PC-jr., here is a matching enclosure to house your disk drive. We have the controller available also. The case has an injected molded front bezel to duplicate the looks of the jr.

6. Model# FD-PC5 - This unique enclosure is designed to match your IBM-PC perfectly. Injected molded front bezel, with all steel 18 gauge construction for shielding and strength. It boasts a custom linear supply that delivers 5 amps continuous current. The FD-PC5 is predrilled to hold any 5¼" half height floppy or hard disk or any 5¼" full size floppy or hard disk. We even have adaptor brackets to mount a Syquest 5meg removable!

Retail.....$295.00 1 year warranty

7. Model# 5DHHHA&T - The 5DHHH is designed to house 1 or 2 half height floppy or hard disk drives in the horizontal side by side mode. A lit on-off switch is mounted in the front where it's convenient, and uses our custom linear power supply. A blank plate is available for one drive installations.

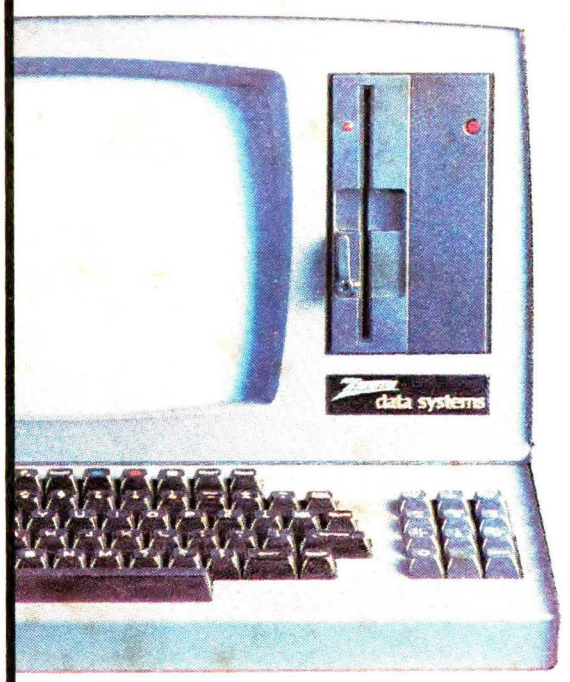
Retail.....$125.00 (floppy model)
$195.00 (hard disk model)
1 year warranty
Retail.....$125.00 (floppy model) $195.00 (hard disk model) 1 year warranty

8. Model# SH8A&T - Will house one full size 8 inch floppy or one or two half height 8" floppy disk drives. Uses a commercial grade 206 series supply, and carries a full 2 year warranty!

Retail.....$199.00

9. Hard disk & Floppies, we carry only the top brands like Shugart and Qume! Don't be fooled by the cheap imitations. We carry only the best, with the strongest warranty around. For example, all Shugart disk drives carry a 1 year warranty. So call for the latest pricing to upgrade your PC, Zenith, Heath, Radio Shack, TI or one of the many other computer systems on the market!

10. We also carry data cables for your system. We can custom make them to your specs, or allow us to help you choose what's right for you.



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